JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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EDITORIAL NOTES—GAS, &c.

A Contented Gaslight Proprietary.

THE spirit of contentment brooded over the meeting of the Gaslight and Coke Company on Friday, so much so that the attitude of the greater number of proprietors was almost one of listlessness. The Governor (Mr. Corbet Woodall) was modest in relating the tale of the continued improvement in the condition of the Company's affairs generally. In quite matter-of-fact style, he pointed to the principal of the tangible financial accretions; and if there is one fault to be found with him, it is that he did not sufficiently emphasize how much better the net result would have looked had the wise and liberal policy of the Board in respect of charges upon revenue account in connection with upkeep and depreciation been kept within narrower limits. But we know the breadth of the Governor's view in this matter; and what is characterized here as "liberal policy" is doubtless, in his estimation, only what should be described as something like normal, having regard to the extent of plant and appliances and the obligations of the Directors and the Company. But if such a liberal policy continues, united to the operation of the redemption fund, and the higher manufacturing results from plant and material, we confidently believe it will be found that the effect will be so soon impressed on the capital employed, and the amount required for interest and dividend, per million cubic feet of gas sold, that the proprietors and the Stock Exchange will not be long in properly appreciating what this course of events implies for the future of the concern. Taking the last half year only, the net addition to the capital account was the (comparatively speaking) trifling amount of £872; and the increase in the sale of gas was about 352 millions. These are significant figures. The Governor looks upon the increase of 3¼ per cent. in the consumption of gas as "the most satisfactory "feature" in the report. Commercially, that may be so; but technically in our opinion the result in cost and yield of the manufacturing operations may justly stand as a claimant for equality in descriptive distinction. However, on the accounts as a whole there was accord among the proprietors as to the improvement in healthy state, as to prosperity and prospects, and as to the vigorous and co-operative action that has contributed to the bringing of these things to pass.

The Governor made passing, but deservedly generous, recognition of the benefits that are accruing from the scheme of technical instruction for the staff officers and employees. It is sufficient that the education thus afforded is advantageous in the intellectual improvement of the employees, and in the primary purpose of the scheme of raising the level of competence and efficiency in treating with customers and work. But there are important secondary advantages, in that by examination the men are able to gain distinction, and the Board are thus in a position to promote according to merit rather than by that most unsatisfactory and misleading guide—favour.

This purely domestic matter (which, however, should be an object-lesson to gas administrators generally) was the connecting link in the Governor's address between present financial position and future prospects. Naturally, the coal question is one that is too momentous to be avoided at this time in any address from the chair of a Gas Company. As previously pointed out, the increased cost of raw material to the Company in the current year represents the heavy strain on the business of no less a sum than £250,000; but it is a gratifying piece of intelligence that it is the deliberate view of the Governor and his colleagues that, by the aid of the £60,000 or thereabouts to be derived from reimposing meter-rents, the income of the coming twelve months will "probably" meet the expenditure. We devoutly hope that it will be so, and that, by the time the next coal contracts have to be negotiated, there will be a turn in the coal market, and easier prices. It is all a matter for speculation as to the future of coal prices. The prophets are busy, but unreliable. If omens have any greater weight on one side than another, they do not give hope of a speedy issue out of the present affliction for industry. No one can tell what will happen; but the general feeling is that the day is distant when the old prices will again obtain. Revived business in home manufacture is not the only cause underlying the present high prices. If it were, there would be some reason for thankfulness. The great increase in coal sales for abroad, the difficulty of obtaining deliveries over railways and through congested ports—a difficulty accentuated by the increase in coal exports—and the concurrent tightening of the screw by the railway companies, are all disturbing factors; and there are the prospective disconcerting ones of legislative interference between coalmaster and man. The extreme free traders still laugh at the allegation that the removal of the coal tax has anything to do with the present perversity in the coal market. There are as good free traders who hold a contrary opinion. No one can accuse Sir George Livesey and Mr. Corbet Woodall of being Protectionists; but their opinion is that the removal of the coal tax was not justified, and has not been justified by events. Lord Claud Hamilton, at the meeting of the Great Eastern Railway Company last week, made a like declaration. The thing, however, has been done; and we have perforce to make the best of the present conditions. So far as the Gaslight and Coke Company are concerned, and they are not alone in this, the heavy tax of the increased coal price has deferred the hope of the Board of making a reduction in the charges for gas.

Mingled with other points bearing upon prospects, the Governor had something to say regarding the restoration of meter-rents, the removal of which, as we have recently hinted, he regards as having been a blunder, in view of the change having been made by the Company alone in London. Yet another subject was that of smokeless fuel. The Company are willing, ready, aye and are already supplying the fuel which they have designated "Carbo;" and next winter, the Governor states, they will be doing quite a large business in it. We do not know what the Coalite people will say to this, or whether they will round off an insane idea of proceeding for an infringement of patents through the Company having taken it into their heads to do part of their carbonization at somewhat lower temperatures than are now ordinarily employed in gas-making, and for exposing the charges to those temperatures for a shorter length of time. There has not been much heard of the Coalite Company since they exhibited to the public an inordinate desire to handle its money in bulk. Why are their glowing advertisement-articles dropped, why have the demonstrations of coalite in hotel basements ceased, and why have several things that happened prior to the issue of the prospectus not been continued? Why the silence? This is digression, but it arises out of the Governor's statement that next winter in the new branch of their business—that is to say the "Carbo" branch—they will be doing quite a large trade. That was not the least of the interesting matters introduced to the notice of a satisfied proprietary on Friday.

South Metropolitan Report and Accounts.

To those not directly engaged in the management and work of the South Metropolitan Gas Company, interest in its affairs rests for the moment rather in the future than in the immediate past, in view of the increase by 3d. in the price of gas from Midsummer and the advance in the cost of coal. The report and the statement of accounts which Sir George Livesey and his colleagues have issued brings to a close—temporarily only, it is hoped—the history of the Company under a 2s. price. It has been a history with disappointments and of unfulfilled expectations, and just as the financial equilibrium has been established, it is again upset by circumstances so falling that the coalowners are placed in a position

in which they can size-up their own demands, and largely enforce them. Scrutinizing the accounts before us, there is not the slightest doubt that had it not been for the contumacious conditions in the coal market, the Company would have been able to have declared that they had fairly "turned "the corner" under the low price for London of 2s. per 1000 cubic feet, and that the business was well capable of sustaining that price. But the position has been changed, and there is no help for it but to make the best of it, as the South Metropolitan Company will do from the Chairman to the humblest of the active co-partners in the concern. While the consumers suffer the increase in price, the proprietors will have the dividend they have been receiving (which has not been of the full statutory amount) reduced by 3s. 4d. per cent., and the bonus of the employees will fall from 9¾ to 7½ per cent., or from £45,000 to £35,000. The report, which is signed by the Chairman, mentions that all the parties interested are thus partners in adversity as well as in prosperity. However true that may be, there is an inequality in the burden of responsibility and anxiety in the times of adversity; but, of course, there are no possible ways or means by which this can be rectified. But the consumers have it within their power to do something in an endeavour to show Parliament that, in any future steps taken to create and shape new situations in the coal industry which may have a tendency to perpetuate higher prices for coal, they, as gas and coal consumers, have a right to consideration. In their report the Directors point out what is in the legislative programme in this direction; and we have it submitted that "if the users of coal—that is everybody—forgetting that "everybody's business is nobody's business, do not press "their claims on Parliament, in opposition to the efforts of "interested parties and faddists, the position is in great "danger of going by default." That is the most suggestive point in this characteristically plain-spoken document.

The higher price of coal touched the business of the past half year; but fortunately about three-quarters of the coal carbonized was delivered under former contracts. The increased expenditure under this head was £51,033; but there was an additional 19,717 tons of coal carbonized, to meet the increased sale of gas. The gas business put on to its substantial dimensions about 147 million cubic feet, which is highly satisfactory, considering the reduction brought about by the incandescent gas-burner. We mention this now somewhat trite matter, because it is observed that, though some 377 additional street-lamps have been erected in the Company's area, the consumption of gas for public lighting in the half year compared with the corresponding period of 1906 is not far short of 67 millions less. But we also see that out of a total of 23,293 public lamps in the Company's district, there are now only 15 of the flat-flame species—no less than 888 flat-flame lamps having gone the way that such inefficient (under the new order of things) lamps must go.

The accounts really do not give much scope for general comment. On the expenditure side of the statement as to revenue, coal is the only item exhibiting any substantial variation from last year. There were decreases in four of the five items covering repairs, maintenance, and renewals under manufacture and distribution, and on balance we have a charge for these purposes of between £9000 and £10,000 less than twelve months ago. The total expenditure was £49,195 more; but, notwithstanding, the balance carried to net revenue account is nearly £12,000 greater. The residuals have done excellently in contributing to this result, for as a matter of fact the increase (£41,207) in the income from this source, was only short of the extra amount paid for coal by £9826. Coke was by far the best contributor to the higher income, with an excess of £30,806 upon the returns for the first six months of last year. But next to coke, gas, at the old price of 2s., gave an increase of £16,444; and altogether the total income came out £61,150 better than a year ago. The general result is that the deficiency of £9364 on the December accounts has been made good; and there is a small balance, after meeting all charges, to be carried forward. There is nothing to complain about in this financial condition. It is excellent with the low price of gas; and with such increases as nearly 15,000 in the number of prepayment consumers, of more than 12,000 in stoves, and nearly 1400 in gas-fires, the prospect of a continuance of advancing consumption—the increase in price notwithstanding—is assured, as far as it is possible to assure it, in the best manner. The prepayment meter consumers, it may be noted as a point of interest, now number 212,945, which is double that of the ordinary consumers, with 11,411 in excess. There are other matters in the report, such as the absurdities surrounding the rating system, which will give the Chairman matter upon which to expatiate when he meets the proprietors to-morrow week.

Glasgow Corporation Gas Affairs.

It is with feelings of no ordinary pleasure that we lay before our readers this week the accounts of the Gas Department of the Glasgow Town Council, for they present a measure of success which, while it must be gratifying to all concerned, is no less so to everyone who takes an interest in gas matters. The financing of the undertaking is a matter of some complexity, but it is getting simpler as the years go by. There are two classes of debt—annuities and corporation loans—and each of these again consists of two branches. The annuities have been from the beginning of two values, the one at 9 and the other at 6¾ per cent. The loans are obtained from the Corporation at the rate of £3 5s. 9d. per cent.; and there is, in addition, a class of 3 per cent. stock, into which a number of the annuities have been converted. There have been no mortgages over the works for ten years—the cheaper method having been adopted of procuring money from the Corporation as bankers; so that not only do the Gas Committee secure money at a low rate of interest, but the machinery for obtaining it is simple and inexpensive. This enables easy working. The train of thought need not be pursued farther; but it may be noted that corporation loans have already been redeemed out of the sinking fund to the amount of £443,363, while from the same fund payments have been made for the redemption of annuities to the amount of £55,482; and, in addition, depreciation has been provided out of revenues to the extent of £1,347,142.

These figures illustrate the vastness of the financial transactions controlled by those at the head of affairs; but it is in the results obtained in the works department that the great vitality of the business will be best understood. An increased output of gas for the year of 250 million cubic feet, is quite a striking feature in itself. It is greater than the annual output in every town in Scotland excepting Edinburgh, Dundee, Aberdeen, Paisley, and Greenock. Yet it followed upon a similar increase the year before. It may not be out of place to recall here that two years ago the Corporation reduced the illuminating power of the gas from 20 to 18 candles; and that whereas in previous years increases of 50 million cubic feet and over were not uncommon, the lower quality gas has, so far, been accompanied by a much larger demand for it. While this comment lies on the surface, it is not to be lost sight of that two years ago also synchronizes with the granting of a concession of 3d. per 1000 cubic feet for gas used in gas-engines and for manufacturing purposes, following which, the report of the Committee bears out, there has been an augmented demand for gas for these purposes amounting to nearly 90 million cubic feet. So that the assumption is by no means warranted that the increased demand for gas is due to consumers requiring to use more of it in order to obtain light. One factor in the situation is sufficient to lay any such thought aside—namely, the greatly extended use of incandescent burners. It follows that the increased consumption of gas must be accounted for by other causes; and in its being found that the gas is used by traders there can only be satisfaction in the thought that the beneficent action of the Corporation has been so handsomely responded to by the traders in the city. Another source of increase was dwelt upon by Mr. T. Calderwood, the able Convener of the Gas Committee. This is to be found in the great expansion of business through the use of prepayment meters. The Corporation are very wisely not pushing these, as hitherto, at the rates charged; there has not been much profit upon the gas sold through them. An extra charge of 5d. per 1000 cubic feet has not sufficed to make prepayment meters profitable in Glasgow. The difference has consequently been increased to 7d., which is considered by Mr. Wilson, the Engineer, to be about the figure which will make the account square. The Gas Committee are fully aware of the enhanced cost of working prepayment meters, and that a considerable proportion of this enhancement lies in the disposition there is on the part of consumers who contribute the least to the revenue to have ordinary meters substituted by prepayment ones. Therefore the Committee are to present a firm front

to applicants, unless these be for the fitting-up of a whole tenement—when, of course, it might be good policy (there being no sacrifice to begin with) to stretch a point in order to keep out other illuminants. There may be the other consideration with the Committee that they have pretty well saturated the community with this form of meter, and that, having secured a business which now amounts to some 167 million cubic feet a year, there is not much call upon them to go farther in the same direction.

The Gas Committee have entered into new contracts for the disposal of the residual products at Dawsholm and Tradeston, from which better results are anticipated. These might be expected to follow, in due course, from the increased cost of coal; but another element may probably be found in competition leading to an improvement in the offers received. One effect of the very large increase in the consumption of gas is found in the fact that the Gas Committee are already applying their minds to the question of extending the gas-works at Provan, in the first section of which gas was begun to be made in July, 1904. Nothing has yet been settled in connection with this extension. The Corporation have, however, appointed a deputation of two members of the Committee, with the Engineer, to visit places where vertical retorts are to be seen at work. This will secure that the form of retorts named will not be overlooked when the time comes for consideration of details; and from the manner the gas-works in Glasgow have hitherto been thrown open to everything which was most up-to-date, there may be the fullest and freest anticipation that vertical retorts, if their merits stand investigation, will not be denied an opportunity on the banks of the Clyde of showing what they are capable of doing.

A Pernicious Lighting Scheme Strangled.

The inspection and revision of the Progressive management of local affairs in London are bringing to light a great deal of false representation, especially in matters electrical. The Woolwich imbroglio is a case in point; another the misleading but plausible invention which had for its design the supplementing of the public lighting business of the Islington Electricity Department by displacing by electricity 714 incandescent gas-lamps. It was high time that a party was placed in power competent to overhaul and revise the deeds and plans of the ambitious and impetuous Progressives, whose principle of action is to live for the present and allow the future to take care of itself. It was a big public lighting scheme—big, but yet only the beginning of a still more stupendous project—that the Progressives tried to force through at Islington last year; and while they affected to show ratepayers that there would be financial advantage in the project, the ratepayers were shy—having had experience of what electric lighting had done for them in increasing the public lighting account—and asked among themselves whether there was not something behind the fair report that they received. There was something behind it; and it was the loading of the electricity undertaking with an amount of capital that a careful scrutiny (by a Special Committee appointed last December) of the affairs of the concern and the prospects of the scheme has disclosed, could not possibly be remunerative. The decision of the Progressives was heralded with a shrill fanfare by the newspapers of their political colour. But they have made less noise over the exposure of the highly embellished reports of last year. The Special Committee aver that "the scheme was ill-conceived, and, if "carried out, would be detrimental to the interests of the "borough." The same could be said of many another scheme of public electric lighting that has been carried out. We have failed to detect that cities and towns and the people have exhibited any improved tendencies as the result of the great additional annual expenditure to which they have been subjected on this score. In the case of Islington, the Special Committee have arrived at their determination that the scheme should be dropped, in face of the fact that a substantial amount of the material required for it has been purchased. They prefer at once to make a clean cut of losses; and their preference has been established by a vote of 37 in favour against the unlucky number of 13 in opposition. The figures in the Committee's report are well worth looking into; and they will be found in our "Miscellaneous "News." Among other things, it will be remarked that 101 miles of streets are "well lit" with incandescent gas-burners at a cost of £160 per mile, against £810 per mile for electricity. The Committee let the "cat out of the bag" in pointing out that this was only the beginning of a Progressive scheme for lighting the whole borough by electricity, at a cost of a quarter of a million. Of such are Progressive notions of economical and efficient local government.

Electricity a Gas-Works Bye-Product.

What is the true scope of a gas-works, asks Herr Kobbert, of Königsberg, in the paper he read at the last meeting of the German Association of Gas Engineers; and his own answer is that the border-line of scope will not be reached until the gas-works becomes in verity, as well as in name, the central station of city or town for light, heat, and power. Then, and not till then, will the gas-works fulfil its destiny. If we keep Herr Kobbert's ideal before us, there will certainly never be any feeling of space being restricted within which to exercise energy. Economical considerations, in his view, demand that no coal shall be burned for any purpose whatever within the confines of city or suburbs; but that it shall all be dealt with first at the gas-works—the products only being utilized for light, heat, or power. Even where electricity is employed as the illuminating agent, the current should, in his opinion, really be a product of the gas maker. The incurious may pass with a laugh the idea of electricity being in the nature of a product (or a bye-product, rather), of a gas-works; but there is a case in England where it is seriously so considered. We cannot, of course, except so far as the merits of gas and the means of utilization will carry us, control the whims and fancies of other people, in regard to light, heat, and power. There are some who will have electricity for one, two, or all three purposes; but we are not satisfied yet that, even as a "bye-"product," except within certain limits, and under certain circumstances, electricity supply would form for a gas-works a good commercial speculation. Ascot and one or two other places are proposing to remove all doubt upon the subject. We shall see.

However, just before Herr Kobbert was stating his views at Mannheim, Mr. Alexander M. Cobban was claiming, at the Windsor meeting of the Association of Water Engineers, that the electricity he employs for power at the pumping-station from which Scunthorpe is supplied with water, some 4¾ miles away in the wilds, is actually a bye-product of the gas-works. The fuel used under the steam-boilers at the works is coke breeze and sweepings; and the steam is utilized both for the gas-works machinery and for the electricity generating plant. Mr. Cobban regards this as the best way of obtaining his power. Whether it is or is not, is a question we can dismiss here; the only point of interest for us being that of regarding electricity as a bye-product of gas manufacture. If Mr. Cobban had a steam plant at the pumping-station, it would involve the expense of carting solid fuel every day over 4¾ miles to a somewhat inaccessible place, instead of, as now, simply transmitting gas-works generated electricity by cable. Therefore, by coal being carbonized and gas produced, the resultant coke breeze being used under the steam-boiler, and the steam being employed for the generating of electricity, Mr. Cobban saves cartage, and the pumping-station is innocent of steam plant and its costly accessories. He is satisfied that in this case the right thing has been done; and that the electricity used for the pumping-station may be truly regarded as a bye-product of the gas-works. With Mr. Cobban, there can be no cause of dispute from a gas engineer's point of view. He is contented, and that is the main thing. Gas-works are ever willing to do all sorts of business within the limits of their powers—at a profit.

Professor Smithells on the Phenomenon of Flame.

Those of our readers who have followed the career of Professor Smithells doubtless shared the gratification we felt at the announcement that he was to preside over the work of the Chemical Section at the annual meeting of the British Association this year at Leicester. The meeting opened last Wednesday; and the next day Professor Smithells delivered his Inaugural Address. It was naturally expected (indeed, it was intimated in a forecast of the proceedings) that he would deal largely with a subject to which he has devoted special attention—viz., the phenomenon of flame; and it will be seen from the extracts given in another column that he brought under the notice of his audience matters of considerable interest. He

pointed out that the consideration of flame temperatures has become of increasing importance in the arts, owing to the use of the Welsbach mantle. He showed that the great improvements made in atmospheric burners depend primarily upon the fact that the smaller the external surface of a flame from gas consumed at a fixed rate, the higher must be the average temperature; and since the emission of light from a mantle is proportional to a high power of the absolute temperature, a small increase in temperature has a great effect on luminosity. The portion of the address we have given is of special value to our readers; and we therefore commend it to their attention. They are already acquainted with the author's investigations in the direction indicated; and they will doubtless look forward to the results of those which we are told are being carried out by Professor Bone at the Leeds University, especially as, in his capacity of head of the Fuel and Gas Engineering Department, he has lately come into such close touch with the industry with which they are identified. Professor Smithells concluded his address with some general observations on the progress of chemical science.

The Sliding-Scale and Profit-Sharing in Boston (Mass.).

Readers may possibly remember that about two years ago there was an amalgamation of the Gas Companies in Boston (Mass.), and that the new organization started on a fresh career under the presidency of Mr. James L. Richards, who had worked out the consolidation scheme, and carried it into effect. Mr. Richards, who is a man of remarkable business capacity, soon made it known that he intended to take the direct management of the concern, and "run" it (to use an Americanism) on thoroughly up-to-date lines; and early intimation was given that the consumers would have a great deal more attention than they had hitherto received. A conspicuous item in his "progressive" programme—in the right sense of the term—was the reduction of the price of gas; and the first step in this direction was taken on July 1, 1905, when the charge of $1 per 1000 cubic feet was lowered to 95 c. It will be seen, from an article which appears elsewhere, that three similar reductions have since been made—the last coming into operation on the 1st ult. As the Company are working under the sliding-scale system, they may increase their dividend for the year commencing July 1, 1908, to 9 per cent.—that for the year closing on the 30th of June last having been 7 per cent. For the current twelve months it will be 8 per cent. Not only have the consumers and shareholders profited by the Company's advanced policy, but the employees also; for a profit-sharing system similar to the one initiated by Sir George Livesey (some of the beneficial results of which are noticed elsewhere), is in operation. Consequently, the three parties immediately concerned with the Company's operations—the consumers, the shareholders, and the employees—share in the prosperity of the undertaking. But the advantages of the sliding-scale are not confined to the financial benefits resulting from its adoption. It has undoubtedly been the means of securing the good-will of the citizens. Proof of this is afforded by the remarks of Mr. Louis D. Brandeis which will be found in another column. This gentleman is a prominent lawyer, a leading citizen of Boston, and a member of the Public Franchise League—a body which has had much to do with guarding the interests of the public in connection with gas legislation. When his observations are read in the light of the fact that till comparatively recently he was an opponent of the old Gas Companies, the wisdom of the adoption of the policy which has effected the change in his attitude will not require emphasizing. Mr. Brandeis acknowledges that Mr. Richards has shown that a man may become recognized as a useful public servant while he is engaged in the business of making money for his stockholders; and that "the surest way to make money in public franchise corporations is to co-operate with, instead of antagonizing, the people." He considers that if more of the corporations referred to were managed by men of the ability, enterprise, and public spirit of the President of the Boston Consolidated Gas Company, "the cry for municipal ownership would soon subside." This is testimony which, coming as it does from a man of the position of Mr. Brandeis, we are pleased to place on record.

In another part of the "JOURNAL" will be found the programme for the annual meeting of the Irish Association of Gas Managers, which will be held in the Lecture Theatre of the Royal Dublin Society, next Tuesday, Mr. T. J. Reid presiding.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 404.)

THE Stock Exchange has had a really disheartening week; for, bad as things were before, they went from bad to worse. Consols again were about the weakest spot in the markets; and the persistent selling at last caused a measure of apprehension. To be sure, the low prices tempted a few buyers for investment to step in; but there were no operations of any magnitude sufficient to stem the rout. As to the responsible factors specially affecting last week—apart from those adverted to in our last issue—there was the Moroccan incident, which did not fail to arouse anxiety, occurring as it did in a quarter which is dreaded almost as an international powder magazine. Then the affair of the Irish Police did not tend to infuse a brighter tone; and the railway agitation was again prominently in view. From the opening on Monday, things commenced to fall. Consols were half-a-point lower, on forced sales; and the general outlook was dark. On Tuesday, a deeper depth was reached; and Consols marked 82⅜, which must be quite a record. But before the day closed there was something of a rebound from the lowest point. Thus Wednesday opened rather less dismally. The improvement, however, did not last; and the announcement of a failure appeared ominous. From this point the depression increased, with scarcely a ray anywhere; and so the week came sadly to an end on Friday—Saturday being a closed day. In the Money Market there was a good demand, which materially hardened rates for short loans; and discount stiffened somewhat also. Business in the Gas Market was very quiet, and changes were few and slight. In Gaslight and Coke issues, the ordinary was lightly dealt in at prices ranging from 96 to 94¼ (a fall of 1). In the secured issues, the preference marked 105¼; and the debenture, 82. South Metropolitan was quiet and firm, and was done at from 120½ to 122. The debenture marked 82½. One bargain in the 4 per cent. at 106⅛ was all the business in Commercials. In the Suburban and Provincial group, Alliance old marked 20¾; British, 41½; and West Ham, 104¼. Among the Continental Companies, Imperial changed hands at from 175 to 173½, and Cagliari at 26½ and 26¼. Among the undertakings of the remoter world, Buenos Ayres was done at 11⅛; Cape Town preference, at 8 special; Oriental, at 141½; Primitiva preference, at 5¼; and San Paulo, at 13¼.

ELECTRIC LIGHTING MEMORANDA.

Incongruous Voltages and Lamps and other Appliances—Reforming the Nernst Lamp—Photometry to the Rescue of the Incandescent Electric Lamp User—Osram Lamps and Side Street Lighting.

A PARTICULARLY outspoken article by Mr. A. C. Hanson has appeared in the "Electrical Review." Its purport is the case for low-pressure electricity distribution; it also shows in parallel the fearful muddle the electrical industry is in between voltages and new lamps and appliances. The primary reason for going from low to high—that is to say, to about double the old—pressures was the saving of copper; and when the price of copper to-day is looked at, the bare thought of retracing steps to low pressures, with the double disadvantage for the electricity concern of greater capital outlay and reduced consumption through the economy of the metallic filament lamps at low voltages, is enough to make the station engineer perceptibly shiver. Well, Mr. Hanson has some unkind—they may be justifiable—things to say about high voltage carbon filament lamps. He asserts—and who can dispute the assertion?—that they are worse now than the low-voltage lamps of year ago. Later, in a couple of passages, he makes a point that has frequently been put forward in these "Memoranda." "With," he says, "a statutory declared voltage of 250, in reality ranging from 240 to 270, the light given by a 250-volt lamp is a very variable quantity, and is not often that at which it is rated. The price per Board of Trade unit by itself is only a very rough indication of the cost of electric light." Mr. Hanson rubs in the case thickly for low voltages; but to what purpose under the conditions of electricity supply in this country, is a question over which we shall not trouble to rack our brains. He tells station engineers something of which they are all too painfully aware—that practically all the different types of lamps are better on low than on high voltages for which distribution systems are laid out. The carbon filament lamp is more efficient on low voltages, the metallic filament lamp may be used singly on them, the open type arc lamp may be burned economically in pairs, and the enclosed arc lamp singly. The only commercial lamp that is really better on high than low voltages is the Nernst; but—this is a case of hitting a lamp when it is down—"few consumers would be sorry if this type of lamp was as dead as Queen Anne, if they could use metallic filament lamps without being under the necessity of running them in series." With this, the hard-hitting Mr. Hanson has not done with the Nernst lamp, but gives it a second blow in the sentences: "The initial efficiency of the Nernst lamp, though probably never as high as is claimed by the makers, is certainly better than that of the carbon filament lamp, but its very rapid deterioration and general unreliability make it but a doubtful blessing to users of electric light."

Mr. Hanson finds it difficult to believe that a satisfactory low

candle-power lamp at 220 volts will be produced; and at present practically all the metallic filament lamps have to be run in series on high voltages—this being inconvenient in some instances, and quite unsuitable in many. In the case of arc lamps, the advantage of low pressures is admittedly not so great; and, in this connection, we have the writer of the article admitting that where quantity of light is the only requirement, the flame arc lamp is probably the only form of electric lamp—at the average rates of charge—which will show a decided economy over the latest forms of high-pressure gas-lamps. For shop lighting, we quite agree—apart from capital expenditure, lamp renewals, expensive carbons, and attention—if the alternative is between two high-pressure gas-lamps and four flame-arc lamps, in many cases the gas-lamps will win. Breaking from Mr. Hanson for the moment, while referring to flame-arc lamps, it may be mentioned that in the "Electrical Times" an article has appeared on the magnetite arc lamp, in which, allusion having been made to one difficulty, it is remarked "the other difficulty with the lamp (*in common with flame arcs*) still remains. It is that the magnetite electrode is volatilized, and leaves a reddish soot that settles on everything it touches, so that a chimney is a very necessary feature in the lamp." Returning to Mr. Hanson, he admits that for large motors the advantages of high pressures may be allowed; but the great majority of motors are of a size more suited to low voltages. He also attributes the slowness of the advance in the electrical heating department to "at least in part," the prevalent high voltages. Running expense and low efficiency, unreliability, and cost of repairs, we happen to know, are other causes. There is much in the article that, in the interests of the electrical industry, must not be permitted to reach the eyes of the general public; but there are two among the final points in the case for low pressures that we would strongly counsel should be kept strictly hidden from the outside world. Says Mr. Hanson, "a 220-volt shock is decidedly disconcerting to nearly all, and absolutely dangerous to some; whereas a 110-volt shock would hardly be felt by the majority. Of course, no one should be exposed to the risk of shocks; but in these days of jerry wiring and jerry building, the marvel is that so many escape." On the question of meters, it is said that "even with careful supervision, it is impossible to ensure that a large proportion of meters will even start on a 220-volt 8-candle power lamp"—that is to say, many electricity consumers may find, by a very simple test, that they can run an 8-candle power lamp week in week out without the meter making any note of the fact. But there we are. The sum and substance of Mr. Hanson's article is that high voltages have been largely perpetuated in this country, and there is hardly anything among the new lamps and appliances to fit them.

Allusion is made to the Nernst lamp in the opening paragraph, from which it will be gathered that the complaints of many months ago as to this type of lamp have been fully justified. The makers themselves now also admit that there was ground for those complaints. They were pushed into such a corner over them, that they were bound to do something to preserve the Nernst lamp business from utter extinction. Statistics were collected by them, relating to the premature failure of the "burners;" and the result of the inquiry has shown the necessity for improving the heater circuit, which generally failed, and in some cases caused breakage of the filament. Unfortunately, the makers are unable to dispense with the heater circuit, but (they give their word for it) that this circuit is now perfectly controlled by improving the insulation and design of the cut-out coils. Things must indeed have been bad, seeing they are fitting free the new cut-out coils to all Nernst lamps of which they have any record; and since April 1 they have refitted no less than 22,700 lamps in different parts of the country. Of the old coils returned, about 60 per cent. were entirely burnt out. Well we shall see now whether this simple change has really eradicated a long-continued disease. If it proves to be so, why was it not made before?

Such a large number of electricity lamps on the market are so inefficient and wrongly graded that, in the protection of the consumers, some central station engineers are taking up the much neglected (among them) science of photometry. But those engineers are of the few and not of the majority. The few have been forced to the conclusion that their responsibilities do not end with the provision of electricity, but that they must keep watch and ward over mischievous influences at the consumers' end. Mr. R. M'Court read a paper on this subject, at the recent meeting of the Incorporated Municipal Electrical Association, telling what is being done at Harrogate, in this matter of testing lamps, by the Electricity Department in co-operation with the local contractors; and the testing, with the rejection of the inefficient lamps, is very essential. It is noticed, however, that lamps are certified as fit for use which come within very wide limits. For instance, 5-candle power lamps are satisfactory which come anywhere between the limits of 4 to 6·5 candles; 8-candle power lamps, between 7 to 9 candles; 16-candle power lamps, 14 to 18 candles; 25-candle power lamps, 22 to 28 candles; 32-candle power lamps, 28 to 36 candles. A 12½ per cent. difference either way is a pretty big margin; but its adoption is in agreement with the specification of the Engineering Standards Committee. This is pretty conclusive evidence that the manufacture of electric lamps falls very short in exact result. One speaker in the discussion on Mr. M'Court's paper suggested that lamps should be started on their career in more perfect condition than with such a great variation as 12½ per cent. either way from their reputed candle power. We quite agree with him; for incandescent electric lamps are not long in departing on their own account, and by the aid of inconstant voltages, from their original performance. Another speaker cited the case of one consumer who was using a 32-candle power lamp giving only 18 candles, and another with a 16-candle lamp giving only 6-candle power. How can electricians hope to be exempt from the complaint of consumers under such conditions? At Blackpool they are satisfied if so-called 16-candle power lamps come within 5½ watts per candle and do not fall below 10 candles!

Then there are the much-vaunted Osram lamps. We recently showed that their nominal illuminating power is given in Hefner units, instead of British standard candles, and that they, like the carbon filament lamps, do not in use establish claims. We have Mr. M'Court's testimony on this head. He states that, with the last six dozen Osram lamps tested at Harrogate, the actual illuminating power of the 32-candle lamps varied from 17 to 36 candles; and the watts used from 29 to 36. The 50-candle power lamps varied from 27 to 44 candles; and the watts from 36 to 48. This does not by a long chalk meet the Standards Committee's specification for carbon filament lamps. Other speakers referred to the difficulty of pairing these lamps; and proper pairing is very essential for good effect and result on most electricity distribution systems. The "Electrician" is looking to these lamps—some day—solving the problem of the lighting of side streets; and our contemporary is partly persuaded on this point by a statement of Mr. M'Court that he had photometrically compared one Osram lamp and one incandescent gas-lamp in the streets. During one month they were giving respectively 54 and 36 candles; and the previous month 54·5 candles and 25·2 candles respectively. This was street photometry, and by the Harrison photometer! Sufficient said. But Mr. M'Court is asking much if he expects us to place reliance on such figures. We should like to point out to him that it seems rather strange that, in the street, he should have got a return of 54·5 and 54 candles from a 50-candle Osram lamp, while from the 50-candle part of the parcel of six dozen Osrams, tested under the more refined conditions of the laboratory, he found the illuminating power varied between 27 and 44 candles. The figures of 54·5 and 54 do not therefore evoke much confidence; but nevertheless the "Electrician" uses them as the text for a whole editorial article. There is no reason why a 3 cubic feet incandescent gas-lamp should, unless there is neglect, be actually giving anything like so low a return as 25·2 candles. But the figures for these two isolated lamps are used to show that, with electricity at 3d. per unit and gas at 2s. 10d. per 1000 cubic feet, there is a saving—by electrical calculation on paper—in favour of electricity of 17·6 per cent. Now an incandescent burner, consuming 3 cubic feet an hour, should give a light of about 50 candles (not between 17 and 44 as Mr. M'Court says is the case with the 50-candle power Osram lamp); and three pennyworth of gas at 2s. 10d. per 1000 cubic feet should last about thirty hours. An Osram lamp, using 52 watts per hour, would run away with a threepenny unit of electricity in less than ten hours. Say, too, that for street lighting these Osram lamps would have to be renewed at least four times a year, reckoning the long life attributed to them under the benevolent regulated conditions of the laboratory, there would be another 17s. a year to be expended. However, although the "Electrician" thinks that "such a lamp *really appears* to afford a solution of the problem of side-street lighting," it adds these ominous words:

> In the case of street lighting, there is something to be said in favour of using a number of low-voltage lamps in series. The difficulty in doing so, however, apart from the question of extinction of a number of lamps through the failure of one, is that all lamps required for running in series on any one circuit must be made practically identical in order to give satisfactory results. At the present stage of manufacture, it is quite possible that this difficulty cannot be very satisfactorily met without careful selection. A certain amount of trouble has been caused on private lighting circuits by lamps differing to some extent, so that both lamps of a pair do not burn at the same efficiency; but this difficulty is, no doubt, one that will gradually disappear.

Trust our electrical friends for pointing out a good feature of their wares without finding some counterbalancing disadvantage. We will not complain. Honesty is the best policy. But where these lamps are strung up in series for street lighting, there we can see more troubles in store for the public from failures of the light. There the subject may be left for the present.

Mr. T. D. Hall, late Manager of the Montrose Gas Company (and latterly residing in Edinburgh), died suddenly at his residence there, No. 59, Viewforth Gardens, on Thursday last. His remains were interred at St. Andrews on Saturday.

MM. L. Fabre and P. Espinasse have devised the following process for the manufacture of an impermeable compressed block withstanding great pressure, and constituted by a mixture of gravel and sand cemented together with coal tar. The materials are mixed and heated to a very high temperature, and then compressed hot and cold, either by a roller or by hydraulic stones, and finally dried. This compressed material can, it is stated, be employed like cement, concrete, asphalt, &c., as it can be cast in the form of flags or paving-blocks for roads, pavements, foundations of buildings in damp soil, or drain and water pipes. Its crushing strength is considerable, and it makes a very good road surface for traffic, as there is no dust, and it can be washed without production of mud.

INTERNATIONAL PHOTOMETRIC COMMITTEE.

Second Session at Zurich.

FROM OUR SPECIAL CORRESPONDENT.

(*Continued from p.* 301.)

THE communications by Heer van Rossum du Chattel and Mr. J. W. Helps, as to the methods generally followed in Holland and England respectively for measuring the light of incandescent gas-burners, which have already been given in the "JOURNAL" (*ante*, pp. 224 and 235), were presented in pursuance of a scheme propounded at the 1903 session of the Committee for the collection of such information from all the countries represented. But from no other countries except Germany was information forthcoming; and this was for the most part a recapitulation by Dr. Krüss, of Hamburg, of particulars already published in the annual reports of the Photometric Committee of the German Association of Gas and Water Engineers.* He referred to the fact that the Association had formerly issued rules for the testing of incandescent burners, and that they had come up for revision. But the advent of the inverted gas-burner had rendered it necessary to make them considerably more comprehensive; and the required modifications were now being considered by the Committee of the Association. The question of the best means of determining the lower hemispherical illuminating power of sources of light had to be settled by the Committee. Professor Drehschmidt followed with some observations on the use of the Ulbricht sphere and mirror photometers for the determination of mean spherical illuminating power.

Discussion ensued as to what apparatus should be employed for testing the illuminating power of mantles, and whether their standard illuminating power should be taken to be (1) the horizontal intensity, (2) the intensity in whatever direction it is at a maximum, (3) the mean spherical intensity, or (4) the mean hemispherical intensity. Professor Brodhun reported that the Imperial Physico-Technical Institute at Charlottenburg had not investigated any apparatus for determining the mean hemispherical illuminating power. It would be of a special type. For spherical photometry, the globe of Professor Ulbricht, of Dresden, or mirrors were used; but the Institute had so far done little in spherical photometry. Mr. Paterson, in answer to a question, said that the National Physical Laboratory had as yet no special apparatus for the determination of spherical illuminating power, but they had used M. Laporte's method with two rotating mirrors, which admitted of a distribution curve being obtained. M. Lauriol stated that he had two of Blondel's spheres, one 80 centimetres and the other 3 metres in size; but he had made only a few tests with them, and had no information as to their exactness. For testing the efficiency of street-lamps, he had made measurements with mirrors of the lower hemispherical illuminating power, which was the most important for this purpose. But for the lighting of interiors, the spherical illuminating power became more important because of the reflection of light from the ceilings and walls. He would be disposed, when comparing upturned with inverted burners for lighting rooms, to take the spherical illuminating power of the former and the lower hemispherical power of the latter. In reply to a question as to whether the light of incandescent gas-burners—especially powerful ones—would not be affected by their being enclosed in a sphere for photometrical purposes, he agreed that it was quite possible it would be so. He also said that the large sphere which he had had made was dead-white inside, and was perhaps more like Professor Ulbricht's pattern than the original Blondel illumination photometer.

Dr. Krüss later presented a report on the negotiations which had taken place between the Association of German Electricians, the Association of German Electricity Works, and the German Association of Gas and Water Engineers, with a view to the adoption of general rules for the photometry of both electric arc and incandescent gas lamps. The electricians had proposed the following prescription: "The efficiency of an arc lamp is estimated practically according to its most important application—viz., for the direct lighting of the space beneath the horizontal plane of the source of light. Therefore the mean lower hemispherical illuminating power constitutes its practical measure. For this mean lower hemispherical illuminating power, the symbol $I_{\supset}$ is proposed, and $HK_{\supset}$ for its value expressed in Hefners. To this may be added, in brackets, the factor (k), by which the mean lower hemispherical illuminating power must be multiplied in order to give the mean spherical illuminating power, using the expression ($k_o = \ldots$)."

Gas engineers had pointed out that the gas industry differed from the electrical industry in that it had a great number of sources of intensity, ranging from the ordinary Welsbach burner to the powerful intensified burners, with which the light emanating upwards was not always small as with the electric arc light, which was practically the only high-power light the electricians had to consider. Consequently, gas engineers attached great importance to mean spherical illuminating power. But they granted that for outdoor lighting only the lower hemispherical illuminating power came into account; and to this extent they agreed that the proposition of the electricians might be applied in substance to high-power gas-lights. The German Association of Gas and Water Engineers would undertake to consider in what way the rules for the photometry of arc lamps could be made applicable to high-power gas-lights for outdoor lighting. It might be possible to state also the mean spherical illuminating power directly, and not only through the medium of the factor k_o, though the use of the factor was valuable in that the ratio of the light radiated above a horizontal plane to that radiated below it could by its aid be readily calculated.

Further discussion ensued upon Dr. Krüss's communication, and some of the points discussed were raised again the following day, when Professor Drehschmidt's proposed symbols for representing the manner in which illuminating power had been determined (see *ante*, p. 224) were agreed to.

Before the re-assembling of the Committee on the afternoon of Friday, the 19th ult., most of the members accepted an invitation from Professor E. J. Constam to visit the recently established Fuel-Testing Laboratory attached to the Polytechnic. The visit was most instructive. Owing to the dearness of coal and of briquettes in Switzerland, consequent on the whole supply of fuel having to be imported from a considerable distance, the State decided to establish this testing laboratory, under Professor Constam's charge, for the purpose of checking the quality of the fuel bought by the State railways and private users. The freight on coal carried to Switzerland is a considerably heavier item than the original cost of the coal, and is, of course, the same whether the coal is of high or low quality. Consequently, it does not pay the Swiss to import inferior coal; and it answers to inspect and test the supplies very thoroughly in order to exclude coal which is indifferent or not up to the specified quality.

The new testing laboratory serves to control the quality of the supplies, and also incidentally to determine the most suitable coal for different uses. It comprises a well-arranged and well-equipped building, on the ground floor of which are rooms for unpacking the samples, air-drying, and crushing them. The friability of briquettes is tested by means of a rumbling drum, into which 50 kilos. (about 1 cwt.) of the briquettes are put. The drum is given a certain number of turns at a definite speed, and is then opened, and the contents are turned out on to a screen which is agitated so that the dust falls through on to a tray in which it is weighed. All samples of briquettes are treated in precisely the same manner, so that the results are strictly comparable. Those which under this treatment produce more than 50 per cent. of their weight of dust, are considered too friable, and would be rejected for the State railways, which mainly use this class of fuel. The drum and indeed all the mechanical appliances used in the laboratory are driven by electric power. Various crushing-machines, for reducing the samples to different degrees of fineness, are provided, and there is an ingenious press for compressing a small measure of finely divided coal into a tablet, which is then weighed and introduced into a bomb calorimeter for the determination of the calorific power.

The calorimeter room upstairs contains six platinum-lined bomb calorimeters of good design, in which the weighed portion of fuel is burnt by oxygen admitted from a cylinder under pressure. The nitric acid formed from the nitrogen always present in small quantity in the compressed oxygen is estimated volumetrically, and the sulphuric acid from the sulphur in the fuel is also determined. The ash is determined in muffle furnaces, and the coke in platinum crucibles heated for a specific time over a screened and governed gas-flame. The gas supply to the various rooms is taken through a 2-inch pipe, so that the turning on or off of one or two burners has no effect on the rate of consumption of the others. There is a furnace-room for ultimate analyses, a well-equipped balance-room in which female labour gives satisfaction, and a strong-room in which a quantity of special platinum apparatus is stored. The samples of ash and coke kept for reference are not the least useful part of the contents of the laboratory. There is a room with a Junkers calorimeter for testing gas; also a small library of modern works on fuel. Altogether, the arrangements reflect the greatest credit on Professor Constam, who is responsible for them, and who continues to act as Director of the Laboratory.

After the members of the Committee had returned from their visit of inspection, M. Vautier, the President, referred to the platinum unit of light proposed by M. Violle more than twenty years ago, and to our more recent knowledge as to the melting-point of pure platinum. The work of Moissan with the electric furnace, and the production thereby of chemically pure platinum, had, he said, greatly simplified researches with this metal. Quite recently Mr. Harker had, with a special type of electric furnace, still further simplified the manipulation; so that now determinations could be satisfactorily undertaken on the melting-point of platinum. These would be of the greatest importance in the practical application of molten platinum as a unit of light.

Mr. Helps said M. Vautier had earlier communicated with him with reference to Mr. Harker's paper before the Royal Society (in which he described his electric furnace), and had suggested that with this furnace platinum might possibly be kept at the fusing-point, and so made applicable as a primary standard. He had thereupon made inquiries, and had ascertained that, if the International Photometric Committee had expressed any wish that Mr. Harker should apply his electric furnace towards the establishment of a molten platinum primary standard, the research would be carried out at the National Physical Laboratory. Mr. Paterson said Mr. Harker's furnace seemed to promise a means of obtaining a constant high temperature. Probably with it the method to be followed would be to raise the platinum to about 1800° C., allow

* See "JOURNAL," Vol. XCVIII., p. 812.

it to cool down nearly to the point of solidification, and then retard the cooling in order to obtain at this point the desired standard of light. The furnace tube of Mr. Harker's largest furnace hitherto was only 15 millimetres in diameter; but for the work on the molten platinum standard, if undertaken, a furnace with a tube 25 or perhaps even 30 millimetres in diameter would, if possible, be employed. Some discussion took place as to the material of the Harker furnace; and Dr. Brodhun mentioned the Nernst electric furnace in use at the Reichsanstalt, in which a lining of iridium is employed.

M. Vautier next spoke on the unification of the different methods for determining the illuminating power of incandescent gas lights. He said it was most important to distinguish between the several elements, as, for instance, the burner, the mantle, the form and temperature of the flame, and the position of the mantle in the flame. It was desirable to have a recognized standard burner for mantle testing, and to have the mantles of determined size and form. After M. Sainte-Claire Deville, Herr Strache, Professor Drehschmidt, and others, had spoken, the President suggested that a consumption of 100 litres (3·53 cubic feet) per hour under a pressure of 40 millimetres (16·10ths) should be recognized as standard conditions for incandescent burner and mantle testing. But Professor Drehschmidt pointed out that the normal rate of consumption in Berlin was 120 litres (4·24 cubic feet) per hour, and said it would not answer to use a lower rate for testing purposes. It appeared to be still too soon to fix a standard burner and standard conditions for mantle testing.

The Committee sat, on the morning of Saturday, July 20, under the chairmanship of Herr Nolte, of Berlin, as the President was assisting at the deliberations of the Sub-Committee who were engaged in settling the ratios to be adopted between the intensities of the three chief standards of light. The first matter dealt with was the unification of screw-threads. It will be remembered that the consideration of this subject was somewhat anomalously referred by the International Gas Congress of 1900 to the International Photometric Committee who were then established. M. Payet presented a paper on the question at the first session of the Committee in 1903; and a Sub-Committee were then appointed to communicate with the Technical Associations of the different countries with regard to it.* Dr. Hugo Krüss now reported what had taken place in the meantime in Germany with reference to it. He said that the proposals of M. Payet, which he himself favoured, had come too late to the knowledge of those concerned in Germany for them to find general acceptance. The German Technical Associations had agreed to conclusions which he had reported at the fifteenth assembly of German Mechanical Engineers at Goslar, in 1904. The Association of German Engineers had, after consultation with the Associations of Gas and Water Engineers, of Heating Engineers, and of Pipe-Makers, decided, in 1903, to adopt the Whitworth threads for all pipes with threads from 13 mm. to 114 mm. ($\frac{1}{2}$ inch to $4\frac{1}{2}$ inches) in diameter. The Associations of Opticians and Apparatus Makers, however, decided to adopt for optical and delicate mechanical work the international system of screw-threads. Full details of the data which led up to, and are involved in, these decisions will be found in Dr. Krüss's report in the "Zeitschrift für Instrumentenkunde," 1905, pp. 22-23.

M. Sainte-Claire Deville next recited the chief points of his long report on the researches which he has carried out since the first session of the International Committee on the illuminating power, both in ordinary and incandescent burners, of coal gas, water gas, and mixtures of the two. He referred to the various influences to which the illuminating power of gas, as expressed by the number of litres (*i.e.*, the rate of consumption) required to yield the unit of light, is subject. For instance, it was affected by the quantity of air reaching the flame, and the degree of completeness of combustion. He believed that the calorific power of the gas had a considerably greater effect on illuminating power than the temperature of combustion, and he thought a determination of the calorific power should serve as an exact criterion of the value of the gas. He proposed, therefore, that testing the illuminating power of the gas should be given up in favour of determination of calorific value. An abstract translation of M. Sainte-Claire Deville's voluminous communication will be published in the "JOURNAL" shortly; so that it is unnecessary now to go more fully into its contents. Professor H. Strache offered a very vigorous criticism of the author's contentions. He referred to the effect on illuminating power of the size and shape of the flame, and of the temperature of combustion. These points were not yet, he said, sufficiently considered. It was essential that further investigations should be carried out before the old modes of testing were given up as the author had proposed.

In the afternoon, as already reported, Mr. Helps read the paper by Mr. Carpenter and himself on the "New Standard Test Burner for London Gas" (*ante*, p. 235); and then the resolutions of the Committee were passed and the proceedings brought to a conclusion, as stated in the first instalment of this report (*ante*, p. 224). A point of interest in regard to the Metropolitan argand burner No. 2 was that Dr. L. J. Terneden, of Amsterdam, had with him a specimen of an argand burner, devised by Heer E. F. v. d. Waereld, of Utrecht, in 1902, in which the internal air supply only can be regulated by a damper rotating on a screw, as does the damper of the "Metropolitan" argand. This burner was adopted in 1903 by the Dutch Association of Gas Managers.

* See "JOURNAL," Vol. LXXXIII., p. 34.

PROFESSOR SMITHELLS ON THE PHENOMENON OF FLAME.

THE Annual Meeting of the British Association was opened at Leicester last Wednesday, under the presidency of Sir David Gill, late Astronomer-Royal at the Cape; and the following day the work of the various sections commenced. The President of the Chemical Section is Professor A. SMITHELLS, B.Sc., F.R.S., who chose as the subject of his address "The Phenomenon of Flame." The following are the portions of the address which bear upon this interesting question.

The topic of flame, after a long period of repose, has aroused much interest during late years; and I think we may say that some considerable progress has been made in its elucidation, though in this, as in all other subjects of scientific inquiry, the more closely we scrutinize it the more impressed must we be with what still remains unknown.

One of the first questions to meet us in the study of flame is that of the temperature at which, in any given case, the phenomenon becomes evident. Here, I think, a great clarification of view has taken place. The old idea that there existed a fixed temperature at which inflammation suddenly took place cannot now be maintained, and the term "ignition temperature" has acquired a different meaning. It is now known that in a very great number of cases a mixture of two flame-forming gases, when gradually raised in temperature, will develop luminosity quite gradually *pari passu* with the chemical combination that is being induced. This phenomenon is, of course, known universally in connection with phosphorus; but it is not so widely known in connection with other combustible substances. I do not know how many times the independent discovery has been made that sulphur, arsenic, carbon disulphide, alcohol, ether, paraffin, and a whole host of other compounds, inorganic and organic, will phosphoresce as truly as phosphorus itself—that, in fact, phosphorescent combustion is the normal phenomenon antecedent to what we ordinarily call flame.

This is, after all, only in harmony with the general truth that chemical combination between two gases does not set in suddenly, but comes into evidence quite gradually as the temperature is raised from a point at which the action, if it occurs at all, is so slow as to be negligible. The change from phosphorescence to ordinary flame is not sudden, but the appearance of ordinary flame is the end-point of a continuous, though rapid, development. This end-point is the temperature of ignition. What, then, determines the temperature of ignition? The answer to this question has been given with characteristic conciseness by Van 't Hoff as "the temperature at which the initial loss of heat due to conduction, &c., is equal to the heat evolved in the same time by the chemical reaction."

Temperature of ignition is, then, neither a temperature at which combination suddenly begins, nor one dependent solely on the nature of the combining gases. It will vary with the proportion in which the gases are mixed and with their pressure and other circumstances. Notwithstanding the simplicity of this conception, it must be admitted that there are many obscure facts connected with the ignition of gases. The inflammability of gaseous mixtures is not necessarily greatest when they are mixed in the proportions theoretically required for complete combination. The influence of foreign gases does not appear to follow any simple law; the presence of a very small quantity of a foreign gas may exercise a profound influence on the ignition temperature as in the case of the addition of ethylene to hydrogen. When a mixture of methane and air is raised to its ignition temperature, a sensible interval (about 10 seconds) elapses before inflammation occurs. These facts are cognate to others which have increased upon us so abundantly in connection with the influence of moisture on chemical change.

The structure of flames has always been regarded as dependent upon the chemical changes taking place in the differentiated regions; but until recent times little attention has been given to any question beyond the cause of the bright luminosity of hydrocarbon flames. In a flame such as that of hydrogen, or carbon monoxide, where we have some reason to suppose that the same kind of chemical transaction is taking place throughout the region of combustion, we should not expect to find a differentiation of structure; and, as a matter of fact, we do not find any. Erroneous ideas have gained currency from the use of impure gases; and hydrogen is still described as burning with a pale blue flame, although Stas long ago stated that if the gas is highly purified, and the air freed from dust, the flame, even in a dark room, can only be discovered by feeling for it—a fact consistent with the line spectrum of water lying wholly in the ultra-violet. The presence of a very small quantity of free oxygen in carbon monoxide destroys the perfect simplicity of the single shell of blue flame with which the purified gas burns; and in other flames small quantities of gaseous impurities or of atmospheric dust give rise to features of structure and halos which have been frequently supposed to pertain to the flame of the combining gases. The fringe of a flame in air may be often tinged by the presence of oxides of nitrogen.

No flame better illustrates the relation of structure to chemical processes than that of cyanogen, where the two steps in the oxidation of the carbon are clearly marked out in colour. Apart

from hydrocarbon flames, very few others have been carefully explored from this point of view. There is, unfortunately, no gas composed of two combustible gaseous elements; and, though such gases as the hydrides of phosphorus and sulphur do not fall far short of this, the experimental difficulties of an exact exploration of their flames are very great. We are thus prevented from studying the flame of a composite combustible in its simplest of forms.

The flames of hydrocarbons have naturally been the subject of most frequent investigation. The use of single hydrocarbons instead of the mixtures present in coal gas and other common combustibles has simplified the study considerably. Two problems stand out prominently. One is to trace the steps in the oxidation of the hydrocarbon; the other to account for the bright patch of yellow luminosity. With regard to the question of the luminosity, I do not think there is any longer doubt about its being due essentially to the separation within the flame of minute solid particles of what is practically carbon. The separation seems to be adequately explained by the high temperature of the blue burning walls of the flame, which decomposes the unburnt hydrocarbon within. In a similar way, arsenic and sulphur and phosphorus are liberated within flames of their hydrides; but these elements, being volatile, do not appear as solids unless a cold object be placed within the flame. In the case of the hydride of silicon, the liberated element at once oxidizes to form the solid non-volatile oxide, which gives a bright glow.

The mode in which a hydrocarbon yields carbon by the application of a high temperature has been the subject of experiment and of hypothesis. But neither the view of Berthelot, that the carbon results from a continual coalescence of hydrocarbon molecules with elimination of hydrogen, nor that of Lewes, according to which the formation and sudden decomposition of acetylene is the essence of the phenomenon, appears to me to be in harmony with the experimental facts; and I am not aware that either view has secured any support from other workers in this field. It is certainly not easy to ascertain experimentally the changes undergone by a single hydrocarbon as its temperature is raised; and at the last it may be objected that the course of events in contact with the solid walls of a containing vessel is not necessarily the same as that within the gaseous envelope of a flame. I am glad to think that there is promise of further light on this subject from the work of Professor Bone.

The course of oxidation of hydrocarbons has been the subject of very careful and fruitful study. The old view that a selective or preferential oxidation of the hydrogen always took place—that with a restricted supply of oxygen the hydrogen was oxidized and the carbon set free—is, I think, no longer maintained by anyone who has studied the question. The explosion of ethylene with its own volume of oxygen, which leaves us with practically all the carbon oxidized and all the hydrogen free, is fatal to this view. Again, when hydrocarbons are burnt in a flame with a restricted supply of air, as is the case in the inner cone of the flame of a well-aërated bunsen burner, there is clearly no separation of solid carbon; and the products of combustion, when withdrawn and analyzed, disclose the presence of much free hydrogen and no unoxidized carbon.

The admirable researches carried out in the University of Manchester by Professor Bone and his collaborators, have afforded most valuable information as to the oxidation of hydrocarbons at temperatures extending from those of incipient oxidation up to the highest ones that prevail in a flame. According to Professor Bone, the oxidation of a hydrocarbon involves nothing in the nature of a selective or preferential oxidation of the carbon or the hydrogen; but it occurs in several well-defined stages, during which oxygen enters into, and is incorporated with, the hydrocarbon molecule, forming oxygenated intermediate products, among which are alcohols and aldehydes. The reaction, just referred to, between ethylene and an equal volume of oxygen is, according to Professor Bone, to be represented by the scheme:

$$\begin{array}{ccccccc} CH_2 & & CH.OH & & CH.OH & & H_2C:O \quad H_2+CO \\ \| & \longrightarrow & | & \longrightarrow & | & \longrightarrow & \\ CH_2 & & CH_2 & & CH.OH & & H_2C:O \quad H_2+CO \end{array}$$

There can be no question about the facts on which this scheme is based, and they are a new and important addition to knowledge; but there are reasons that prevent me from accepting entirely the interpretation which he has given to his experimental results. [Professor Smithells stated his reasons.]

The mode of burning of carbon, whether in the free state or as a constituent of a compound, is not at all easy to determine; and, notwithstanding many investigations, among which must be specially mentioned those of Professor Harold B. Dixon and his collaborators, so simple-looking a question as whether carbon forms carbon monoxide by directly uniting with oxygen, or only by reducing carbon dioxide, is still a matter of uncertainty. Our knowledge concerning the question of flame temperatures has been much improved in recent times, thanks mainly to the admirable work of M. Le Chatelier. The well-known memoir of Mallard and Le Chatelier on the explosion of gases supplied the data which first permitted of a moderately exact calculation of flame temperatures; and the perfection of the thermo-couple by M. Le Chatelier gave us the first instrument that could be used directly for making a satisfactory measurement. The uncertainty connected with this subject may be well illustrated by quoting the temperatures that had at different times been ascribed to the flame of coal gas when consumed in a bunsen burner, where we have had values from 1230° to 2350° C.

With regard to the use of thermo-couples, I may remark that the practical difficulties have been successfully met. The chief difficulty is, of course, to secure that the thermo-junction attains, as nearly as possible, the temperature of the region in which it is immersed. As ordinary flames consist of thin shells of burning gases, on either side of which there is a very rapid fall of temperature, it is necessary to use thin wires, and to dispose them so that there is no appreciable drain of heat from the junction. By using wires of different gauge for the couples, it is possible by extrapolation to arrive at a temperature for a couple of infinitely small cross section, and it is also possible to make a correction for the superior radiating power of the couple as compared with the flame-gases. Without this last correction, a maximum temperature of 1770° C. was obtained for the bunsen flame by Waggener in Germany, and 1780° by White and Traver in America. Correcting for radiation, Berkenbusch found 1830° as the maximum temperature. M. Féry, by an ingenious application of his beautiful optical pyrometer to a flame containing sodium, gives 1871° as the highest temperature of the flame of a bunsen burner burning coal gas.

The consideration of flame temperatures has become of increasing importance in the arts, owing to the use of the Welsbach mantle as a means of deriving light from coal gas. The great improvements which have been made in the efficiency of atmospheric burners depend primarily on the fact that the smaller the external surface we can give to a flame consuming gas at a fixed rate, the higher must be the average temperature; and since the emission of light from a mantle is proportional to a high power of the absolute temperature, a small increase of temperature is of great effect on luminosity. The acetylene-oxygen flame, in which a temperature of about 3500° prevails—not very different from that of the electric arc—is the hottest of the hydrocarbon flames, and finds some important practical uses.

I have already said something about the luminosity of flames so far as relates to the separation and glow of solid carbon. But there remains the more general question of the luminosity of flames containing nothing but gases. The older explanation of the emission of light from combining gases said no more than that the energy liberated during the reaction and appearing as heat raised the product to incandescence—that is to say, so increased the velocity of its molecules and the violence of their collisions that vibrations were set up whose wave-lengths lay within the limits of visible radiation. This explanation has long been questioned; and there is now, I think, a very general agreement that it will not suffice. The average temperature, in fact, prevailing in a flame, if attained in the product of combustion by the supply of heat from outside, does not suffice to make that substance luminous. We are therefore thrown back upon the conclusion that the generation of light in a flame is not a consequence, though it is an accompaniment, of the elevation of temperature.

The question now is: Can we go any farther? To do this we are led to consider individual molecular transactions instead of statistical averages; and the view presents itself that the combining atoms may, in losing their chemical energy, form directly systems of independent vibration where the radiation is such as to fall within the limits of visibility. If we picture such vibrating systems momentarily formed, it is easy to see that by their collision one with another they may acquire, in a secondary way, increased translational motion, and so lead to a state of things where the greater part of their energy is degraded in the form of heat. The high temperature of a flame would then be a consequence rather than a cause of its light. This subject of the mechanism of luminosity, however, like so many others, has now become involved with the theory of electrons, and a chemist may be excused if he hesitates to pursue the subject farther.

Professor Smithells devoted the concluding portion of his interesting address to a few general observations on the progress of chemical science, in the course of which he dwelt upon the advisability of making chemists good craftsmen. At its close, he was accorded a hearty vote of thanks, on the motion of Sir Henry Roscoe, seconded by Professor Armstrong.

At the opening meeting of the Institution of Mechanical Engineers in Aberdeen on Tuesday last, the President (Mr. T. Hurry Riches) announced that Mr. Charles Hawksley had presented £1000 to the Institution, for the foundation of a scholarship or premium in commemoration of the centenary of the birth of his late father, Mr. Thomas Hawksley, a Past-President of the Institution.

An insulating joint to prevent electrolysis has been used in the 6-inch water-pipe which enters the power station of the Cleveland Electric Railway. According to "Engineering Record," it consists of a large wooden washer bolted between special castings forming adjoining ends of the service. Each casting has an 11-inch flange with eight ¾-inch holes by which it is attached to the service-pipe, and a 13½-inch flange with a dished face and eight 1⅛-inch holes to form the insulating joint. The wooden washer is a piece of hard maple boiled in paraffin, and having on each side a ¼-inch boss which fits into the recess in the face of the flange of the casting. The bolts at the joint pass through rubber hose, and their nuts press on large fibre washers.

PERSONAL.

At the meeting of the Water Committee of the Leeds Corporation last Tuesday, Mr. E. W. TERREY was appointed Assistant Water Engineer, in succession to Mr. B. Frankland, who has just obtained the position of Manager to the Weymouth Water Company.

On Saturday, the 27th ult., two presentations were made at the Newport (Mon.) Gas-Works to Mr. THOMAS F. CANNING, on the occasion of his leaving to take the position of Assistant-Manager at the Ilford Gas-Works. The united staff of the secretarial and engineering departments presented him with a handsome dressing-case, and the foremen and workmen (indoor and outdoor) with a gold watch; and both staff and workmen accompanied these presentations with the expression of their very best wishes for the future welfare of the recipient. Mr. Canning feelingly replied—thanking all for their handsome and unexpected gifts, and stating that he could never forget the great kindness the donors had always shown him, more particularly on that day.

SOUTH METROPOLITAN GAS COMPANY.

Half-Yearly Report.

The following is the report of the Directors of this Company for the half year ended the 30th of June, which, with the accounts (see p. 402), will be presented to the proprietors at the ordinary half-yearly meeting on the 14th inst.

The great increase in the cost of coal under the new contracts, and in the rates, has compelled the Directors, much against their will, to increase the price of gas from Midsummer from 2s. to 2s. 3d. per 1000 feet. The reasons for, and the effect of, this action are explained in a notice to the consumers. Suffice it to say that under the sliding-scale (which extends to the employees) consumers, shareholders, and employees share in all losses and gains. The dividend payable at a 2s. 3d. price is 8s. per cent., or £25,700 a year, less than with the price at 2s.; but the actual reduction of dividend next year will only be 3s. 4d. per cent., or £10,700 a year, because the shareholders, although entitled to £5 14s. 8d. per cent., have for the last three years foregone £15,000 a year—only 5½ per cent. nominal having been paid. The nominal dividend, however, is not the actual rate of interest the shareholders get on their investment, because Parliament decreed, by the imposition of the auction clauses in 1876, which require all new gas capital to be issued at the market value, that henceforth gas shareholders should have only the market rate of interest on their investment, which is below 4½ per cent. The Directors mention this because to this day, after 31 years, there is a common and utterly erroneous impression that gas shareholders are in receipt of high dividends. The employees also, under our co-partnership system, receive a certain percentage on their salaries and wages dependent on the price of gas. When the price rises, their bonus falls, and *vice versâ*. They have always had their full bonus. The increase of price reduces it by 2¼ per cent., from 9¾ to 7½ per cent., or from £45,000 to about £35,000 for the ensuing year. Thus all the parties interested are partners in adversity as in prosperity, and it is the interest of shareholders and employees alike to serve their customers—the consumers—well, by selling gas at as low a price as possible. Such a triple partnership is surely the ideal system of trading.

Compare it with the coal trade. Coal owners and coal miners alike are interested, as their present action shows, in getting the highest possible price for their commodity. No bodies of men are better able to take care of themselves; yet, to enable them to increase the export of coal, Parliament repeals the coal tax, which the foreigner paid, and, by aiding him, the price in the home market is increased. Parliament also introduces Eight-Hour Bills, which, if passed, will increase the cost of getting coal; while the interest of the consumer of coal, which means every individual in the country, is ignored and forgotten. In this matter, the interest of the consumer of coal—be he a manufacturer or a railway, water, gas, or electrical company, or the domestic user—is paramount. If the users of coal—that is everybody—forgetting that everybody's business is nobody's business, do not press their claims on Parliament in opposition to the efforts of interested parties and faddists, the position is in great danger of going by default. For this reason the point is mentioned here.

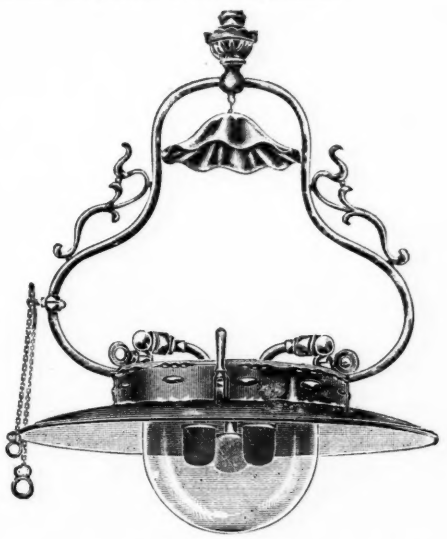
The accounts are satisfactory. More than three-fourths of the coal used in the half year was under last year's coal contracts; while the receipts for products were better all through the half year, and there was an increase of 2·6 per cent. in the gas-rental. Thereby the deficiency of £9364 on the December accounts has been made up, and there is a small balance to carry forward. The Directors therefore recommend the same dividend as has been paid for several years past—viz., at the rate of 5¾ per cent. for the half year. The dividend payable next time will be at the rate of £5 6s. 8d. per cent.

The system of rating gas companies could not be more unsatisfactory, confusing to the last degree, understood by no one, and perhaps least of all by the Courts of Quarter Sessions who hear the appeals; for opposing surveyors give free play to their imaginations, with the result that estimates vary enormously. The common impression that gas shareholders are in receipt of high dividends, referred to above, has a mischievous effect on the minds of rating authorities. They are doubly mistaken. Shareholders do not get large interest on their investment, and do not bear more than a small part of the burden of heavy rates or high-priced coal. Under the sliding-scale, while the consumer gets about seven-eighths of all savings and economies in working, he also pays the same proportion of all increases in the cost of working. In regard to rating, it matters little to the shareholder what is paid in rates, because not less than seven-eighths of the amount is transferred to the consumer, who is also the ratepayer; consequently he loses by having to pay more for his gas, *plus* the loss resulting from paying extra rates in this unfair and roundabout way.

If the Company's position is, to an extent, war without, it is peace within. The consumers are well disposed towards the Company; and the employees of all ranks are loyal and interested in its welfare. Of course, in both, there are here and there exceptions; but, speaking generally, the relations are very satisfactory. The partnership in management by the employee Directors, after nine years' experience, has answered the most sanguine expectations. The first scheme was for three years and the second for nine years; but the Directors now think it desirable to make the system permanent, of course with power to the shareholders to terminate it should it not continue to answer its purpose of promoting a true union between employers and employed. They will therefore submit a scheme for the purpose to a special meeting of the proprietors to follow the ordinary general meeting on the 14th of August. A copy of the proposed new scheme will be sent to any shareholder on application to the Secretary.

THE "INVINCIBLE" CLUSTER LAMP.

The increasing popularity of the inverted burner for shop lighting has induced Messrs. Falk, Stadelmann, and Co., Limited, to add another lamp to the many which already exist for this purpose. In designing the "Cluster" lamp shown in the illustration, they have profited by the experience obtained in the past, with the result that the lamp presented embodies all the features which practice has proved to be indispensable.



The lamp, as will be seen, is constructed for three burners of the bracket type, which are so arranged that the mantles are in close proximity to each other—producing, with the aid of the reflector, a powerful downward light, evenly distributed, while at the same time the radiated light is sufficient to prevent any shadow being cast on the ceiling. The burners are controlled by a single lever cock, conveniently operated by chains. Each burner is, in addition, provided with an auxiliary tap as a check on the gas supply, enabling this to be regulated to suit local conditions of pressure, &c., and further admitting of the use of less than three burners at will. The bowl is supported by a cast hinged ring above the reflector. The light is thus unobstructed and perfectly shadowless. The burners can be readily reached by opening the bowl, for mantle renewals, &c. The air chambers of the burners are fitted with a gauze sleeve; thus effectually preventing foreign matter being drawn in at the port-holes with the primary air intake, and thereby keeping the burners perfectly clean. The lamp is specially suited for drapery establishments, show-rooms, offices, and similar places, where a brilliant, steady radiance, without shadow, is required.

The death is announced, in his 74th year, of Mr. Joseph Peel, of Wellfield House, Yeadon. Deceased was Chairman of the Yeadon Water Company.

A FRENCH ENGINEER'S INSTRUCTIONS FOR THE MANAGEMENT OF REGENERATIVE FURNACES.

(*Concluded from p.* 313.)

Management of Producers.

The good management of producers is of great importance; and as it depends on the nature of the fuel and of the system of grate adopted, it may be of use to give some details on the working of: (A) Grates with stepped fire-bars, fed with unpicked coke; (B) of grates with horizontal fire-bars for double regenerative furnaces; and (C) of grates with hinged bars intended for burning mixtures of coke dust and small caking coal.

(A) *Producers having Grates with Stepped Fire-Bars* (figs. 1, 3 and 4*). Grates with stepped fire-bars are at present the most generally employed for burning unpicked coke, coal by itself, or mixed with a certain amount of coke, and mixtures of various fuels. Such grates are particularly suitable for simple regenerative furnaces, and allow of using with the coke from 10 to 25 per cent. of coke dust. For this to burn suitably, the dust ought to be mixed with the coke, not merely thrown on with a shovel above the charge of coke. It is advantageous to add a little coal dust or coal sweepings to the mixture.

According to the nature of the coke used and the dimensions of the producer, the complete clinkering—that is, using the false spear bars—ought to be done every twelve, twenty-four, thirty-six, or forty-eight hours. When some coals are being carbonized, which give coke the clinker of which can be got out by merely pricking the fire, clinkering with false bars need only be done once or twice a week; but in such a case it is necessary for the producers to have a grate area amply sufficient, and for the intermediate prickings to be done regularly. To facilitate the complete clinkering, a certain number of square or flat wrought-iron bars, pointed at their ends, are pushed in between the top space of the stepped fire-bars, so that there is formed a sort of false grate, nearly horizontal, on which rests the coke contained in the producer. Then the stepped fire-bars are taken out, in order to be able the more easily to withdraw the clinker. The clinkering being finished, the stepped bars are again put back, the false grate-bars are withdrawn, and the producer charged. The false fire-bars can be hammered straight at once on being withdrawn from the producer. During the whole time of the complete clinkering, it is well to half shut the waste-gas dampers or to open wide the secondary-air slides, so as to reduce the amount of unburned carbonic oxide gas which will escape as a pure loss through the chimney.

The light clinkering or pricking, without false fire-bars, is done simply with a spear or pricker and a rake every six, twelve, or twenty-four hours, according to the nature of the fuel, and the dimensions of the grate. The clinker taken out can be left in the basin of the producers until the complete clinkering be done. In the interval of the light clinkering—that is to say, every two or three hours—a rapid poking and clearing of the fire ought to be done; thus causing the cinders, which accumulate on the fire-bars, to fall through. When the clinkering of the grate is badly or incompletely done, sometimes choking-up of the lower part of the weir or seal (where there is one) of the producer results. It is then necessary completely to empty the producer, and to take out with crowbars the hard clinker which impedes the gas outlet from the producer. The entire emptying of the producers is seldom necessary, and it is best to do it only when the temperature of the bed goes down without reason.

The producer ought always to be kept nearly full of coke, and the charge of coke ought never to be allowed to get below the bottom part of the weir or seal (where there is one). It is this necessity of keeping a sufficient depth of fuel, so as to avoid direct-firing in the producers, which generally leads to the giving up of the use of hot coke for feeding producers of average capacity. Direct firing can, in fact, only be avoided by maintaining above the bars an average thickness of fuel of at least 60 centimetres (or 2 feet). When the producers are placed inside the main structure of the bench, a good precaution is to finish up the charging of the producer with a few shovelfuls of pure coke dust, or mixed with a little coal dust. This prevents the heating and disfiguration of the producer lids through the heat of the incandescent coke.

It is further necessary to watch attentively that the feeding door of the producer shuts tightly, so as to prevent the ingress of cold air if the bed is under a vacuum, or, if the bed is under pressure, or fluctuating, to prevent the issuing flames making the cast-iron door red hot. Again, the stokers must be told not to throw water on to the producer lids at the time of drawing the retorts. [This remark applies equally to the retort mouthpieces.] Generally the producers ought to be charged every two or three hours—that is, once in between the retort charges, which it is easy to do when all the retorts are not charged at the same time, as is the rule in all well-conducted works.

Water ought constantly to be running into the angle-iron sprinkler, and to be falling drop by drop into the basin of the producer, which should always be moist, and even covered with a light and thin film of water. This water sprinkling produces a gas of good quality, prevents the formation of clinker, and assures a longer life for the fire-bars and other iron parts of the producer. It is useless and even harmful, to allow the producer basin to be filled up and to let the water flow outside, for the water is intended to be evaporated.

The producer ought always to have its furnace door shut—except, of course, during clinkering and pricking. The ventilator openings of the door are more or less open according as to whether one wishes to quicken or retard the production of gas. But, as was said before, it is better to have the ventilator openings amply open, and to regulate the admission of gas by means of a special damper, or by simply manipulating the air and waste-gas dampers.

(B) *Producers having Grates with Horizontal Fire-Bars for Double Regenerative Furnaces* (fig. 5*).—Clinkering is done every twelve or twenty-four hours according to the quantity or nature of the clinker made. A false grate is always used for it, which is carried on a support or on a transverse wrought-iron bar. In the intervals of clinkering, it is enough to clear the cinders about every two hours by lightly knocking the underside of the fire-bars. The cinders which accumulate in the bottom of the producer are rather more difficult to get at; but it can be done by passing a sufficiently long rake between the bars. Every six hours it is a good thing to pass a clinker-bar into the bed of fuel, and take away the small clinker that may be found in front of the grate. Care must be taken that the boilers or vaporizers and the ash-pan be always full of water, in the absence of which there is risk of their becoming deteriorated and of the grate becoming red-hot and misshapen. The cinders which drop into the bottom of the ash-pan can be taken out by a special shovel. When, for one reason or another, the vaporizers have to be taken out, the furnace-door must be left half-open and the secondary-air slides opened a little, because, in this system of furnace, opening the furnace-door very considerably increases the amount of gas which arrives at the nostrils. The bed then works, as also during the clinkering, as a simple regenerative furnace; for air no longer passes into the bottom of the regenerators, and there is no hot air arriving under the grate. In ordinary working, on the other hand, the furnace door must be hermetically closed, so that hot primary air—either by itself or else mixed with steam—will be supplied under the grate-bars.

During the drying and gaseous firing of these beds with double regeneration (which are carried out as for those with simple regeneration), the steam from the vaporizers is allowed to escape into the producers by merely taking off the covers of the boilers or vaporizers. These covers are replaced only when the furnace door is to be shut, after having effected the gaseous firing of the bed. A good way of avoiding the rapid eating away of the nose of the producers is to lead to it the steam from one of the vaporizers. The management of double regenerative furnaces is naturally a little more difficult than that of beds with simple regeneration; but it is not necessary to exaggerate this difficulty, which can be easily surmounted by requiring the stokers rigidly to follow the instructions given to them.

(C) *Producers having Grates with Hinged Bars for Burning Coke Dust mixed with 30 or 40 per Cent. of Small Caking Coal* (fig. 6*).—The drying and gas firing of these furnaces are done in the same way as for beds having stepped fire-bars and for double regenerative furnaces. Clinkering with a false grate is effected, also, as with double regenerative furnaces, that is every twelve or twenty-four hours, with this difference, however, that it is rather easier on account of the greater height the fire-bars are above the ground. As for the lighter clinkering and pricking, they also are done easier; for it is enough to give a slight shaking movement to the grate with a clinker-rod in order to cause the cinders to fall and the clinker to separate. This clinker can be raked out by taking out the lower bars of the small stepped fire-bars which are placed above the horizontal grate. The stepped fire-bars enable a false grate to be used for the complete clinkering.

They are an improvement, dating from 1893, on the original patented idea of M. Radot, which dates from April, 1889. Experiments were made on this furnace at the Saint Quentin Gas-Works; and the Manager, M. Frère, read a paper on the system before the Société Technique du Gaz en France in the year 1890. In the different cases which present themselves in actual practice, there is reason to examine and see if the supplementary work imposed on the stokers in order to burn coke dust is not balanced by the advantage of burning a fuel of small value. It is also to be observed that coke dust is generally used for the production of steam, and that 15 to 20 per cent. of coke dust can be used in ordinary producers provided with simple stepped fire-bars. Gas firing of the bed having been started in the usual way—that is, by using ordinary coke, and the bed being brought to nearly its normal temperature, the grate can then be charged with a mixture of small caking coal and coke dust. This charging is to be done in the following way: Every half-hour the sloping floor of the producer is fed through the charging door with 25 to 30 kilos. (56 to 66 lbs.) of fuel. The previous mixture, which will be almost completely caked, can be pushed down by a rod to the bottom of the

* See *ante*, pp. 310-11.

* See *ante*, p. 312.

producer. The pieces of coke formed in this way are sufficiently spongy for the purpose of transforming CO_2 into 2CO under good conditions, which cannot be done, for example, with briquettes, on account of their great density.

In order to avoid air getting in over the bed of fuel, which would have the effect of partially burning the gas produced and of raising the temperature of the inside of the producer to an exaggerated degree, care must be taken that the stokers break into sufficiently small pieces the kind of crust that is formed on the slope of the producer; and the arching that is formed over the grate must also be broken up and made to fall down. When the producers project in front of the façade of the bench, this can be easily done by arranging convenient holes for poking; but it can also be conveniently done, when the producers are within the main walls, as shown in fig. 6, through the producer feeding door. The inconveniences of a high temperature in the interior of the producer are the same as those which arise from working with a direct fire in ordinary producers; and it is necessary to try to reduce this temperature as much as possible in order not to deteriorate too quickly the producer arch. It will be seen, on looking at fig. 6, that the middle bottom retort is made to rest on the arch of the producer itself, in order to cool the arch a little, as it would otherwise be between two fires. In producers for burning coke dust, doors supplying a double current of air to the fire-bars are generally replaced by a simple screen, which hangs from an angle-iron placed in front of the furnace.

The management of producers fed simply with coal is analogous to that of producers charged with coke dust, inasmuch as it is necessary to charge them very frequently so as to have a regular giving off of gas, and to avoid bursts of flame against the retorts and in the producers. These producers are generally provided with a grate with stepped fire-bars; and their weir or seal-wall (if there be one) is placed at a greater height above the grate. Inconveniences inevitably arising from burning coal can be got over by mixing with it 50 per cent. of coke.

It may here be observed that producers having horizontal grates produce more clinker than producers with stepped fire-bars, because the evaporation of water from the ash-pan of the former producers is much less active. They also give a less rich gas. In small works where the heating of the beds by a mixture of coal and coke dust is generally replaced during the night by using coke only, there is therefore a certain disadvantage in adopting horizontal grate bars, whether hinged or not.

Cleaning Out Regenerators.

Regenerators in which the gases circulate horizontally ought to be cleaned out once a month. To do this all that is required is to pass a small wrought iron scraper through the sight-holes in front of the regenerators. When the gas-flues are very long, or there is not much space in front of the regenerators, small lengthening pieces can be screwed on to the end of the scraper. During the cleaning out, it is well to moderate the heat of the bed by half-closing the waste-gas dampers. As soon as the cinders deposited in one flue have been taken out, the sight-hole plug must be put back; care being taken to see it is luted all round, so as to prevent cold air getting in.

The cleaning-out of regenerators, which are arranged so that the waste gases pass through holes in special blocks, need only be done every two or three months, because the greater part of the cinders is deposited on the top of the highest tier of blocks, and eventually forms a sort of ridge, which generally falls by itself into the bottom of the regenerator when it has reached a certain size. Cleaning out in this case consists merely in making the ridge fall down by using a hook. To keep the small vertical passages perfectly clean, a good practice is to open and to shut the waste-gas dampers in the bottom of the regenerator a certain number of times, so as to cause a violent current of gas to pass through the vertical ducts. During this operation (which can be done once a month), the feeding door of the producer and the plugs in the front wall of the bed are generally opened. Again, when, for one reason or another, the regenerators have become blocked up, the small vertical ducts can be cleared by throwing a bucket of water on the top of the regenerator. If this is not done too often, it has no effect on the life of the special blocks, which are brought to a sufficiently high temperature for the phenomenon of calefaction to be produced.

In regenerators where the waste gases circulate along the length of the retorts, cleaning-out is only done at the end of a season—that is, when retorts are being renewed—because, owing to the long passage of the gases, nearly all the cinders drop into the bed itself, which is of considerable advantage in inclined retort systems.

When retorts are taken out from a bed, it is, of course, necessary to cover the openings in the special blocks with laths or small planks so as to prevent the vertical passages from getting stopped up with refractory rubbish. Such rubbish can be cleared out through the sight holes at the bottom of the regenerators; but it is better to prevent it falling into the holes, where it may stick. After the retorts have been taken out, all the small vertical ducts must be swept out with a suitable rod.

If properly built, regenerators should be perfectly tight. If an analysis of the waste gases shows that this tightness has not been achieved, it will be necessary, after having dropped the temperature of the bed a little, to wash the horizontal flues of the regenerators with a thick mop dipped in a fairly clear grouting. The space available for the regenerators being comparatively restricted, gas-works' retort-beds have not too much regenerative surface. Indifferent results are sometimes obtained through endeavouring to increase this surface, while at the same time the regenerators are not made tight—the risk of bye-passing being, of course, increased by the greater length of the waste-gas flues.

Letting-Down a Bed.

Putting a retort-bed out of action is effected as with a direct-fired furnace. The producer being half-filled with hot coke, all the dampers are shut, and all the openings of the bed including the furnace doors are luted, and the bed is allowed to cool down slowly. The water supply to the producer must, of course, be shut off. The retorts should be charged for a last time an hour or two before closing-down the bed. When the bed has cooled down and the retorts have been drawn, the ascension pipes should be plugged up. Where there is a hydraulic main to each bed, its gas-valve can simply be shut.

Self-Sealing Retort-Lids.

At the time of lighting up beds of retorts, mouthpiece bolts have always a tendency to expand with the heat; and it is a good thing to see that they are tightened up again. The cleaning of the inside of the lids can be done with a small iron scraper. For the machined edges of the lid and mouthpiece, it is better to use a copper scraper, with which there is less risk of damaging the surfaces. At the time of mounting retort mouthpieces, it is well to grease the eccentrics of the self-sealing lids with plumbago.

Ascension and Arch Pipes.

When the beds are working at a high temperature, the cleaning out of the pipes should be done methodically and before the obstruction has been formed. One man is enough to keep the pipes and hydraulic main of four or five beds in proper condition. In order that the stokers may not be inconvenienced by the flames or gas given off, the cleaning of pipes should be done when the carbonization is nearly completed—that is to say, 15 to 20 minutes before opening the retort-lids for the draw. If an ascension pipe is badly stopped up, the cleaning-out can be postponed until the retort is drawn, when the obstruction can be burnt-out if necessary. With certain coals which cause but few stoppages, or when the beds are not forced too much, the cleaning-out of pipes can be done by the stokers, because the tar condensing in the ascension pipes collects the pitch and soot, which fall into the retort mouthpiece. It is, however, always necessary to see that the stokers pass a gouge of suitable size into the bottom of the pipes at each draw, because it is very important to keep the bends of the ascension pipes properly free and clean.

Arch-pipes can be cleaned by inserting a sort of sheet-iron scoop into which the pitch and soot are scraped by a scraper. This scoop ought to be long enough to prevent the detached pieces of pitch from falling into the hydraulic main. Another method, adopted in small works, consists in putting into the arch-pipe a fixed thin sheet pipe split in half, and provided with a handle. When this pipe is full of pitch, it is taken out, and another inserted, which thus saves a good deal of time.

Hydraulic Mains—Various Observations.

Cleaning out the hydraulic main ought to be done regularly with a special rake with curved handle, which allows the rod to be conveniently worked from the cleaning-out doors. Thus the pitch which is always deposited after a certain time in the bottom of the hydraulic main can be taken out. When the cleaning out is finished, care must be taken that the covers of the hydraulic main are well luted and replaced, so as to avoid any loss o ammonia. Every morning it is a good thing to run off very slowly a certain amount of thick tar from the bottom of the hydraulic main. At the same time, care must be taken to run into the main an equal volume of water to that of the tar which has been withdrawn.

As the amount of thick tar taken out every day is rather small, sometimes no water is let into the hydraulic main; but it is then necessary only to take out just the thick tar required, say, 20 litres (about 4½ gallons) per bed. For the good working of the hydraulic main, it is convenient (especially where there are high heats), to have a small stream of ammoniacal liquor flowing in at the opposite end to that of the tar-regulating valve, so as to ensure that the dip-pipes shall be sealed in liquor and not in tar. When a hydraulic main is started to work, it is always wise to increase the seal temporarily before sending gas into it from the retorts. The seal can be, for example, 7 or 8 centimetres (about 3 inches), so as to prevent any chance of accident.

It is generally advisable not to push too far in the matter of carbonization; not only because of the reduction in illuminating power, but also for a variety of other reasons—pipe stoppages, formation of thick tar in the hydraulic main, production of naphthalene, shorter life of retorts, larger consumption of fuel, &c. When the ascension pipes begin to get stopped up in an abnormal way, it is an almost certain sign that the beds are too hot, and it is only necessary to close down the draught dampers a little to put everything once more in order.

When the settings have 20-feet "through" retorts, as shown in fig. 4, it is always better, in order to avoid stopped ascension pipes, to have only one gas-outlet pipe of a sufficiently large diameter—say, 7 or 8 inches—and but one hydraulic main per bed. If the charging is done by a coal-projecting machine, and

the coke discharged by a pusher (of the De Brouwer or other type), stoppages and thick tar can be avoided by nearly completely filling up the retorts, and carbonizing the charges in eight hours. With well-proportioned and suitably-heated retorts, these heavy charges do not appear to lead to any inconveniences either as regards make of gas per ton or illuminating power. Besides, they give coke of a denser quality; and scurfing retorts is almost entirely done away with.

It is necessary to arrange that the retorts shall be drawn as soon as the charge is sufficiently burnt off, and that care be taken not to heat the bottom of horizontal retorts too much, or the top of inclined retorts, which leads to a considerable reduction in the lighting power. An excellent practice is not to charge the retorts all at once, and to allow, in small works at all events, a certain liberty to the stokers in carbonizing a given amount of coal in a given time. The carbonization thus becomes fractionized, and instead of having large volumes of gas at certain hours of the day (which may cause some plant to prove insufficient), there is a nearly constant make of gas.

In the manufacture of gas, everything hangs together; and it only requires something to be wrong in the management of the retorts and furnaces for all the rest to go wrong as well. It is therefore for the carbonizing foreman thoroughly to understand the conditions to be aimed at to obtain good results from his retorts, in order that he may be able to remedy at once any inconveniences that may arise in consequence of a change in the coal used, or for any other reason.

THE CENTENARY OF GAS LIGHTING.

(*Continued from p.* 159.)

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We now come to a rather important stage in gas lighting, so far as it concerns the Metropolis, when three of the Companies—viz., the Chartered, the Central Consumers', and the City Company—were brought under the City of London Gas Act, 1868, in which the views of Lord (then Mr.) Cardwell's Committee were substantially incorporated. This Act did not fix a standard price, but a maximum price of 4s. to Jan. 1, 1870, and after that date of 3s. 9d. The following are some of the principal provisions in the Act.

The price was subject to revision by the companies every subsequent January, by appeal to the Board of Trade, if either required. The candle power was raised from 12 to 16; and should the companies reduce the illuminating power below 16 candles, they were to give the consumer a reduction in price of 2½d. per 1000 cubic feet for every candle reduced. The price was never to be higher and the illuminating power never under the Act of 1860—4s. 6d. and 12 candles. Payment of back-dividends was not permitted. The Act defined the burner by which the illuminating power of gas was to be determined. The appointment of Referees by the Board of Trade to prescribe mode of testing, &c., was provided for. By sections 18 and 19, power was given to the companies to draw up schemes for amalgamation. The schemes of the companies desiring amalgamation were to be "framed with a view to the reduction of the expenditure" of the companies. All amalgamation schemes that afterwards took place were subject to this clause. Power was also given to purchase the undertakings of the companies supplying the City, within three years of the passing of the Act, which powers were allowed to lapse.

In concluding their labour, the Gas Committee of 1868 referred to the "satisfactory termination of the contest" in which they had been engaged during three sessions of Parliament. They stated that they had to contend, not merely with Metropolitan Gas Companies, but with the combined parliamentary power of the gas interest of the whole of the country.

In September, 1867, an interesting pamphlet was issued dealing with the labours in Parliament of the authorities during that session in connection with the Bills of the Imperial and the Chartered Gas Companies. The pamphlet was a reprint from the "Journal," and was published for distribution. It contained the speech of Mr. Bontems, the Chairman of the Special Gas Committee, in which he continually refers to the "Journal." For instance, he says: "Then look at the money spent in agitation! The 'Journal of Gas Lighting' says that £100,000 have been lost in parliamentary expenses since the year 1857."

With regard to the revision of prices, there were only three applications between 1868 and 1876—one in 1873, and two in 1874; and there is no doubt that they were brought about by the great coal famine in the early seventies. This famine, which began in 1872 and lasted till well into 1874, was at its worst in 1873, when prices had increased more than 100 per cent. It will be noticed that, by this Statute, the Revision Commissioners were directed to have regard to the question of management, and were only to allow such a price as would yield 10 per cent. profit consistent with "due care and management."

In 1867, the consumption of gas in the Metropolitan area was increasing at an enormous rate. The quantity supplied to the large district served by the Imperial Company doubled every ten years; and as the establishment charges were not increasing in the same ratio, the cost of supply per 1000 cubic feet was naturally diminishing. The following table shows how a very largely increased supply of gas was furnished without a proportionately increased expenditure by the Western Gas Company, for a period before 1856 and 1866:—

—	December, 1856 (before Districting).	December, 1866.	Difference Per Cent.
	£ s. d.	£ s. d.	
Share and loan capital per £100 income	531 9 0	317 9 0	40·2
Share and loan capital per £100 gas-rental	608 7 0	364 8 0	40
	Cubic Feet.	Cubic Feet.	
Gas made	138,000,000	410,000,000	197
Total income	£41,754	£108,651	160
Number of consumers	4,799	11,700	144
	d.	d.	
Amount required for dividend and interest per 1000 feet of gas made	35·04	18·36	47·6

In the early part of 1868, there was issued an extremely interesting pamphlet entitled "London Gas Companies and Gas Consumers—an Important and Exhaustive Article on this Great Public Question;" being reprints from the "Daily News" of that year. The title-page had on it the following: "Great misapprehension exists on the Gas Question; a portion of the Press—and notably the 'Saturday Review'—having accused those who sought, and still continue to seek, for a reform in this gigantic monopoly, of a desire for confiscation. A Committee of the House of Commons, presided over by an experienced and distinguished statesman, have investigated the matter, and have arrived at a conclusion still more unfavourable to the Gas Companies. This report has produced a renewed cry for confiscation, and an elaborate defence of the Companies by a Director of the Imperial Company—the largest, and, as last year's evidence showed, most unfair in its dealing with the consumers, of these great and uncontrolled monopolies. Four articles having lately appeared in the 'Daily News,' written by an unknown hand, and these articles stating the position of matters with great accuracy and impartiality, permission was asked of the proprietors of that newspaper, and at once readily given, to reprint and circulate them. They charge to private consumers 4s., to the rich parish of Marylebone 2s. 11½d., and to the poor parish of Clerkenwell 3s. 7d. for the same quality and quantity of gas." One interesting point in the pamphlet is the cost of gas, at this time (1868)—viz., it being certified by the Engineers of five of the greatest London Companies to be 11½d. at the works. One Company, the West London Junction, who supplied all their gas to one consumer, had sold gas since 1859 at 2s. 10½d. per 1000 cubic feet, and were prepared to sell any quantity at that price.

In this year also (1867) an interesting return was published giving the capital and dividends for the thirteen Gas Companies supplying the Metropolis during 1866.

—	Paid-up Capital.	Dividend Distributed.	Rate o. Dividend. Per Cent.
	£	£	
Chartered Gas Company	810,000	70,779	8¾
City of London Gaslight and Coke Company	388,000	29,312	10, 8, and 4
Commercial Gas Company	437,220	43,718	10
Equitable Gaslight Company	300,000	29,095	10
Great Central Consumers' Company	200,000	20,000	10
Imperial Gaslight and Coke Company	1,355,985	130,308	10 and 7
Independent Gaslight and Coke Company	187,500	15,890	10, 7½, and 5
London Gaslight Company	617,476	46,483	10, 6, and 5
Phœnix Gaslight and Coke Company	774,000	65,925	10, 7½, and 5
Ratcliff Gaslight and Coke Company	100,000	10,000	10
South Metropolitan Gaslight Company	222,950	20,682	10
Surrey Consumers' Gas Company	199,998	18,999	10 and 9
Western Gaslight Company	300,000	29,166	£9 18 10

During 1868, a very strong pamphlet was issued by Mr. C. G. Cleminshaw, the Engineer of the Manchester Gas-Works, entitled the "Gas Supply of the Metropolis: A Word to the Public, the Companies, and the Shareholders." It was a scathing indictment of the thirteen Gas Companies of the Metropolis. In one place the author says that if the 1868 session had been futile, the Companies had been threatened with a Bill by which the consumer would have been supplied with 18-candle power gas at 3s. 6d. per 1000 cubic feet.

There was also an article dealing with the question of the 10 per cent. dividend of the Gas Company. It stated—

> The present arrangement is one that relinquishes all the ordinary guarantees which should surround the interest of the consumer arising from competition, and makes over that increased value which the growing wealth of the community confers upon the trade of gas making entirely to the companies. In contrast with this system, we may mention that followed at Manchester. In this city, works have been constructed at a cost of £760,000, while the working capital may be taken at £50,000; but as the property was in the hands of the Corporation, the profits have been applied from time to time to redeem the capital, so that the bond debt is now only £347,472—a sum of £462,711 of the capital of £810,000 having been redeemed. Manchester was supplied in 1865 and 1856 with 22-candle gas at 3s. 2d. It is not alleged that the London Companies can or should be required to supply more than 18-candle gas at that sum—though Mr. Cleminshaw, formerly

Manager of the Manchester works, told the Committee of 1866 that a 22-candle gas might be supplied for 3s.—but inasmuch as the Companies have compared the capital on which they have to pay dividend with that on which interest has to be paid at Manchester, it is impossible to resist the temptation to observe that it makes all the difference to the body of consumers whether the profits made by their consumption are carried to a fund by which they will be permanently benefited, as at Manchester, or whether the process is to go on for ever for the advantage of a body of monopolists who can render no service to the community which it is not well able to perform for itself. Before any permanent arrangement can be arrived at, it will be necessary for the representatives of the London Companies to accept the fact that the public remains in full possession of its original liberty to provide for its own gas supply, and that any unreasonable insistence upon a supposed vested and guaranteed interest in the requirements of the public must inevitably lead to the loss of the special advantages they now enjoy. The language and attitude of the Companies are quite unseasonable; and they must be reminded that they exist for the consumers, not the consumer for them."

During the session of 1868, the Gaslight and Coke Company promoted, and obtained the Royal Assent to, a Bill consolidating their previous Acts, and had their Charter and bye-laws annulled. The provisions of the City Gas Act were inserted in it to cover the undertaking throughout the Metropolis; the Metropolitan Board of Works being made the Authority. Similar provisions were put in the Imperial Act of 1869, and the South Metropolitan Act of the same date. The prices and illuminating power of these Companies at this time were—

	Price. s. d.	Candle Power.
Imperial	3 9	14
South Metropolitan	3 6	14
Gaslight and Coke	4 0	14
Commercial	4 0	14

The Commercial, London, Independent, Phœnix, Ratcliff, and Surrey Consumers' Companies were not affected by this legislation of 1868-9.

In March, 1868, an improvement was reported with regard to sulphur compounds in the London gas; and it was stated that, "if the present practice of using lime for the purification of gas be carefully followed out, as Mr. Hawksley and Dr. Letheby recommend, the quantity of sulphur will no doubt be under the amount sanctioned by Parliament." In September, 1868, Dr. Letheby further stated: "The marked decrease in the average proportion of sulphur in the gas of the Great Central Company is evidently due to the improved method of purification." This was the last report of Dr. Letheby on the quality of the Metropolitan gas; the Board of Trade having appointed him Chief Gas Examiner. In concluding his report, Dr. Letheby said: "I cannot but regard my appointment as a mark of respect for you, not merely because the Act applies to the City, and has been obtained by your exertions, but also because it is here, and here only in England, that for nearly 17 years there has been a constant and systematic examination of the gas supplied to the public. In the performance of this duty, much useful knowledge has been acquired, and many valuable facts recognized." Thus passed away from the field of active controversy the one man who had left his mark upon the legislation of nearly two decades.

In June, 1869, a statement was issued to the Metropolitan Board of Works by Mr. T. W. Keates, F.C.S., in which reference to the late Mr. W. Sugg's "new argand burner" is made. The author states: "By this burner, the lighting power of common gas is raised, according to report, in the proportion of 100 to 116. As, however, an argand burner of this description is not suitable for ordinary use, and the fishtail is for several reasons likely to be retained as the common burner for the public, I submit it is not fair to the consumers that such a new burner as the new argand burner should be used as a standard, unless they were generally enabled to avail themselves of its advantages. As it is, they must be content with the fishtail, which, even of the best construction, gives only 89 per cent. of the light of the old argand. Compared with the new argand, the light given by the fishtail burner is only 89 out of 116. The fact is that, by the alteration of the standard, the gas gains 16 per cent., leaving the consumer no better off than he was before. The effect will be that the examiner will be obliged to report 16 or 14 as the photometer value, while 14 or 12 candles respectively will be what the public will get."

Amalgamations were now the order of the day. In 1870, the Gaslight and Coke Company purchased the Victoria Docks Gas Company. They also amalgamated with the City of London Company in March, and the famous Great Central Consumers Company in July, of that year, and in 1871 with the Equitable Gas Company.

In connection with the amalgamation of the Great Central Company with the Chartered Company, it came out that one of the reasons why the former had not been able to pay a dividend was owing to the very serious defalcation of one of the officers. So serious was it, that it was set out fully in about two pages in the Act of Parliament or Order in Council amalgamating the Companies in 1870, and was referred to in Parliament again later on. It is presumably the only instance of a defaulter having so much space given to him in an Act. It was referred to as the "Higgs' Defalcation Account." It appears that there was an accountant, or some other officer, of the Company, named Higgs, who had, over a number of years, made away with a sum of between £70,000 and £80,000; and the Company were allowed to put the deficiency to a suspense account and liquidate it by annual instalments of £5000. On the amalgamation, a clause was inserted that on June 30 and Dec. 31 each year, until the deficiency was discharged, the United Company, before payment of any dividend, should carry to the credit of the defalcation fund £2500.

In 1872, the Gaslight and Coke Company went to Parliament for additional capital and new works; and in 1873, with a selling price of 3s. 9d., the Company got it raised on revision to 4s. 4d. The Company were in Parliament in 1873, consolidating their Acts of 1868, 1870, and 1871; and they obtained powers to purchase and use collier ships, lighters, vessels, &c. In 1874, they again got their price raised from 4s. 4d. to 5s. per 1000 cubic feet.

It will easily be gathered from the foregoing facts how enormously the business of the London Companies, as amalgamated, was growing, and how extensive their powers were becoming. The local authorities, therefore, again began to be on the watch; and owing to the rise in price, it was decided, by application to Parliament or otherwise, to ensure a satisfactory supply of gas at a reasonable rate. It having been found in practice that the revisions of price by Commissioners were unsatisfactory, it was resolved to introduce Bills into Parliament for entering into competition with the existing Gas Companies by the erection of new works; for the acquisition, by purchase, of the property of those Companies; and for the further regulation of the Companies. Three separate Bills for carrying out these objects were introduced into Parliament, and were read a first time; but owing to the Government not being prepared to support the second Bill, that and the first were withdrawn.

The remaining Bill, however, for the regulation of the Companies, was proceeded with. It was vigorously opposed by the Companies; but on May 13, 1875, its second reading was carried by an overwhelming majority. It was referred to a Select Committee presided over by Mr. W. E. Forster. Sir George Livesey attended, by order of the Speaker, at the instance of the Metropolitan Board of Works, and gave evidence as to the uselessness of existing regulations, and the necessity for a sliding-scale; and he greatly influenced the Committee. He quoted from an address of his own the previous year to show that he had long been of the same opinion; and on June 25, after an immense amount of evidence had been taken, the preamble of the Bill was passed. The Bill was re-introduced in the following session of Parliament (1876), and read a first time. Eventually the Gaslight and Coke Company themselves introduced a Bill, and as it carried out the provisions of the Metropolis Gas Companies' Bill, it became unnecessary to proceed with the latter. In due time this Bill became the Gaslight and Coke Company's Act of 1876; the authorized capital being fixed at £8,265,000.

(To be continued.)

The Institution and the Workmen's Compensation Act.

With reference to the sheet of questions issued to the members of the Institution of Gas Engineers on the 16th of July, the Committee having the matter in hand have requested the Secretary (Mr. Walter T. Dunn) to ask, through the "JOURNAL," those who have not yet returned it with the replies inserted to kindly do so as soon as possible, and not later than the 20th inst., so as to enable the Committee to complete the preparations they are making for further action.

The Wolstanton Arbitration Proceedings: A Correction.—In Mr. Arthur Valon's evidence in the above arbitration, as reported last week, the figure given by him for depreciation on meters and stoves, in answer to a question by Mr. Honoratus Lloyd, at the bottom of the second column on p. 339, should have been 20 (not 10) per cent.

The Discussion on Mr. Smith's Paper at the North British Meeting.—In the portion of Mr. W. Prince's remarks on Mr. Smith's paper on "Naphthalene Extraction," given last week (p. 323), in which he referred to his experience at Darlington, the number of complaints should have been given as from 200 to 300 (not 2000 to 5000) per day, from 9000 to 10,000 consumers. When speaking of his make of gas, Mr. Prince said it was 10,700 cubic feet per ton, and the six works in Staffordshire alluded to lay within a radius of two miles.

Decomposition of Cement by Sea Water.—The current issue of the "Annales des Ponts et Chaussées" contains a valuable article by M. Le Chatelier on the action of sea water on cements. It is partly a republication of his article on this subject in the "Annales des Mines;" but he has added a concluding portion on the direct decomposition of cements in saline solutions, which here appears for the first time. According to an abstract in the Engineering Supplement to "The Times," M. Le Chatelier states as his conclusion that all hydraulic binding agents, without exception, are capable of being decomposed by sea water; but that the rate of this action varies within wide limits. It becomes relatively slow when alumina is present only in small proportions. The addition of puzzuolana, especially of calcined clay and of trass of good quality, endows all hydraulic cements with considerably increased powers of resistance to the action of sea water. The most essential condition to render cements immune from decomposition in the sea is to reduce to the utmost the volume of water employed in gauging the cement; and it is here that the effect of puzzuolana, quite independent of its chemical action, becomes of value.

THE PRACTICAL MANAGEMENT OF GAS-WORKS.

By Alexander Yuill, of Dundee.

[A Paper read before the North British Association of Gas Managers, July 25.]

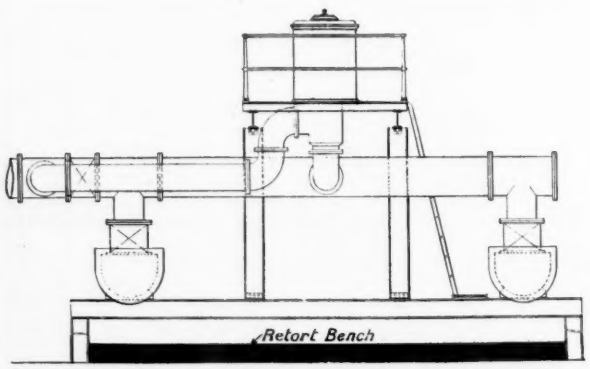
It has often been remarked that some are born to greatness and some have honours thrust upon them. Should you consider my position before you to-day under the latter category, I must appeal to our worthy President to stand as my apologist, as it was only on his urgent demand, which I looked upon as imperative, that I occupy this position before you. I often have had the desire to see some of our younger members stepping upon the rostrum and giving us their experience. They occupy a unique position from the fact that they are untrammelled from all form of superstition which confines the ideas of some who have been enthralled into the chaotic state of use and wont. I have always been a believer in the axiom that "there is often another way of doing things besides the customary;" and the notes I purpose laying before you are more on these lines than as resulting from any spirit of inventiveness.

It is advisable to keep before us the principle that "fortunes are made from savings and not from earnings;" and no department of gas-works offers such scope for the realization of this than close attention to the ordinary work and routine in the retort-house. Regarding retort-construction, the student of gas-engineering has now placed before him for his benefit the investigations and research of the past; leading up from the single retort heated with a form of furnace—the prototype of which, no doubt, was copied from a furnace applicable to the heating of an ordinary wash-house boiler—to the latest examples of regenerative settings for inclined and horizontal retorts of twelve in the settings heated by one furnace, with a minimum of fuel which, no doubt, would have excited the envy of a gas engineer of a bygone age.

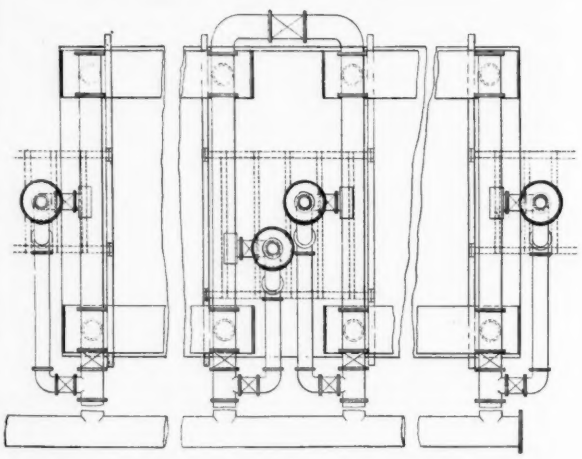
No doubt one of the factors which induces to this economy is the complete combustion of the gaseous fuel used and the utilization of the heat from the products of combustion before leaving the setting. To utilize this to the full, ample chimney area must be at command; otherwise the necessary vacuum can only be attained by raising the chimney temperature so as to lessen the density of the chimney atmosphere, thereby increasing the motive column. Sometimes structural alterations in the settings of retorts can be carried out to lessen that area, which dissipates and robs the gases of their calorific value. In this respect I have found considerable advantage by forming a flat roof above the top settings of the retorts with 12-inch and 4½-inch by 3-inch bricks placed over the 7-inch divisional spaces which extend from the front to the back of the retort-setting, so as to prevent the radiation of heat through the arch of the setting, and also the cutting effect that is sometimes experienced. Since this was adopted, the soffit of the arch is as good as when erected, and the bench is comparatively cool.

To determine the loss of heat dissipated through the crown of the arch and the top of the bench, one must try to calculate the amount of fuel required to maintain this part of the setting to the state of heat sometimes sufficient to fuse the brickwork of the arch, which may be taken, to a large extent, as a direct loss. In our case, the best proof of the economies effected is to be found from the amount of saleable coke and breeze, which averaged for the past two years 11·8 cwt. per ton of coal carbonized over and above that used for heating the retorts.

I have no desire to place before you further particulars as to the latest, and what may be considered the best, form of retort construction, as so many forms are now before you. I prefer leaving this question to the individual opinions of those who are best qualified to judge of what is most advantageous to their varied requirements.



Side Elevation of the Retort-House Governors at the Dundee Gas-Works.

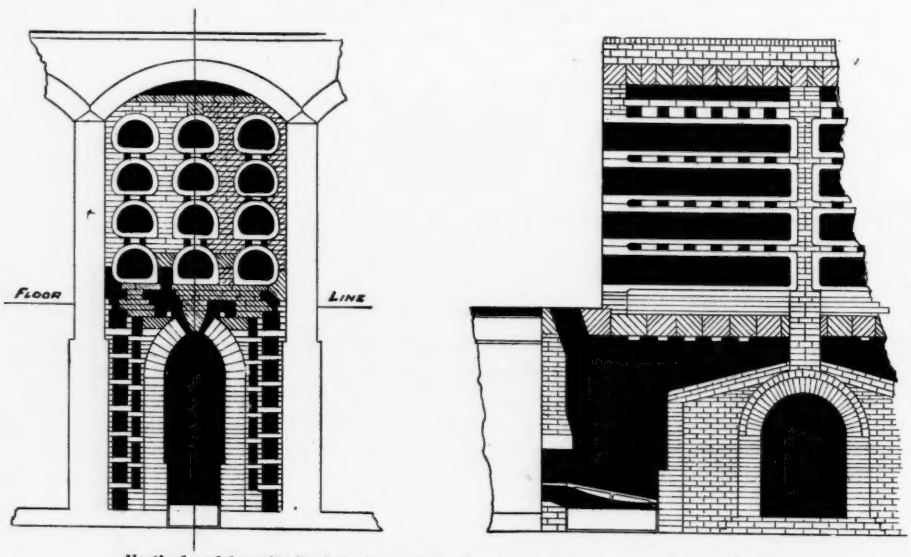


Plan of the Retort-House Governors at the Dundee Gas-Works.

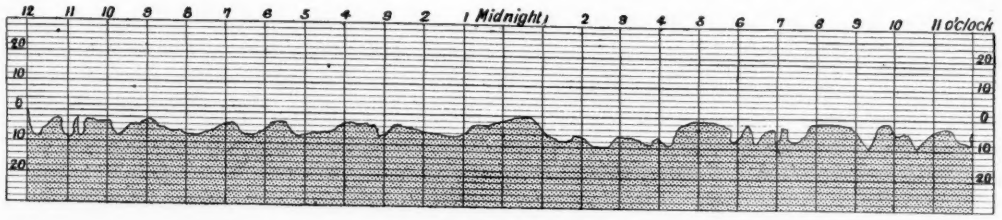
Retort-house governors are now looked upon as essential to the better regulation of the necessary vacuum on the hydraulic main. We have just installed four 12-inch governors, but have not as yet obtained sufficient data to place any reliable figures before you as to the economical advantages to be derived from their use. I hope, however, that by next year the Association will benefit from the experience of someone who has installed similar apparatus at his works, and feels anxious to impart the economies derivable therefrom to his contemporaries.

I may state, however, that the more one studies this question, the more he is convinced of the necessity of having some governing arrangement to lessen the pulsation which oft times takes place in the hydraulic main, due either to the gas from the retorts passing through too great a seal or depth of liquor, or to the vagaries of the exhauster. Now, before one can lessen this seal of liquor, one must have a guarantee of continuity, otherwise difficulties or trouble will be experienced.

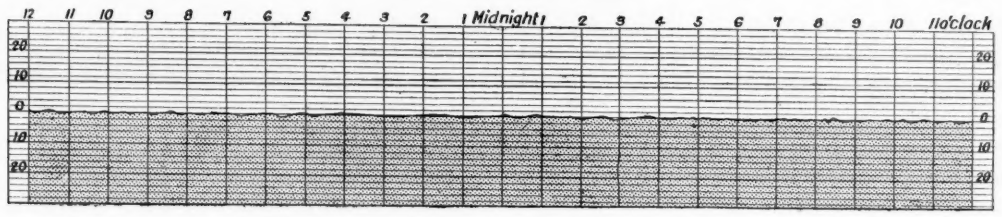
Some may be of opinion that the displacement of the seal in the



Vertical and Longitudinal Sections of the Retort-Settings at the Dundee Gas-Works.

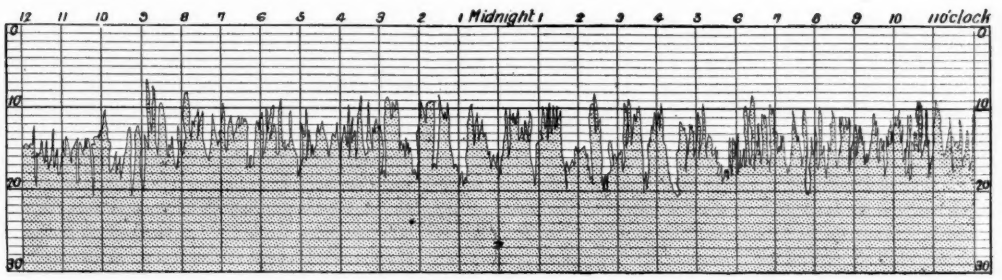


Before Governors were Fitted.

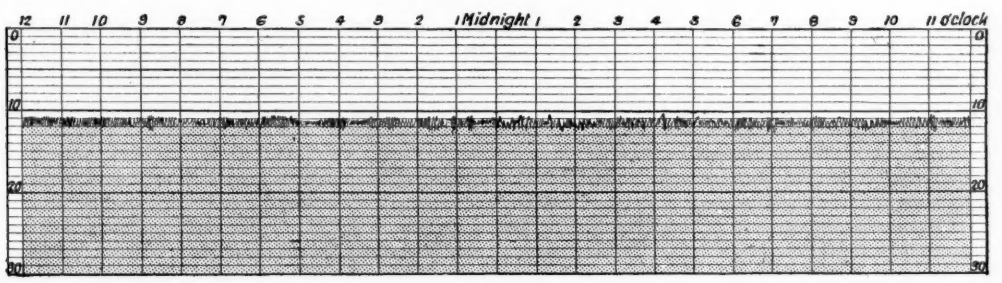


After Governors were Fitted.

Register Diagrams at Hydraulic Mains—Dundee Gas-Works.



Before Regulators were Fitted.



After Regulators were Fitted.

Register Diagrams at Exhauster Inlet—Dundee Gas-Works.

hydraulic may be overcome by increasing the vacuum on the exhauster inlet. This will certainly lessen the pressure on the retort; but it cannot prevent the baneful effects of the hydrocarbon gases passing through the same depth of liquor seal. Supposing we take the dip-pipe with a seal of (say) 1½ inches (to prevent any pulsations in the hydraulic main), and the exhauster working at level gauges, as taken at the hydraulic, and without allowing any extra pressure due to friction, the pressure of the evolving gases will be such as to displace the 1½-inch column of liquor inside the dip-pipe, which also requires to pass through 1½ inches of liquor after having escaped from the pipe.

Supposing we allow the exhauster to exert a vacuum on the hydraulic of (say) 1½ inches, equal to the depth of seal—which, I may state, in passing, is inadvisable, owing to the fluctuation of the liquor level inside the hydraulic—the gas has still to pass through 1½ inches of liquor, which, to some extent, destroys both the volume and the illuminating power of the resultant gases. Now, supposing we were guaranteed that the fluctuations of the liquor in the hydraulic would be reduced to a minimum, we could then reduce the seal of the dip-pipes to (say) 2-10ths of an inch, and the vacuum to a level gauge. The resistance of the gases would then be confined to that due to the passage through the 2-10ths instead of the 15-10ths as formerly.

Nothing that we know of will give these results, except a governor of a size suited to individual requirements. It is imperative that the governor should be placed as near the hydraulic main as possible. As previously noted, I have had four governors fixed; but at the time of writing I have not been able to obtain reliable data to place before you, owing to the short time they have been at work. I may mention, however, that from tests made in our experimental works on an average of three different coals, with a seal of 10-10ths on the dip-pipe and a back-pressure of 5¾ inches with no exhauster, 10,709 cubic feet of gas were obtained, with an illuminating power of 13·82 candles, or 507 lbs. of sperm per ton of coal. With the seal removed, and precautions taken with suitable valves, and with a back-pressure of 1½ inches, the same coal gave 11,182 cubic feet and 14·21 candles with 544 lbs. of sperm value; showing a gain of 473 cubic feet and 0·39 candle.

Regarding the treatment of the gas after it leaves the retort-house, I am conscious that some do not pay the required attention to the regulation of the temperature. At the same time, I must admit that the structural form of the condensers at their command is not the best suited to attain this object. Some may be said to date their creation to a primary age, some to an æsthetic age, and some to what may be termed a utilitarian age. I refer more particularly to the ordinary pipe condenser, the annular condenser, and the water-tube condenser.

In the designing of the ordinary pipe condenser, I have always had them fitted with a cleaning-rod the full length of the box, with an arm about 12 feet long at right angles to the horizontal length, so as to clean either side of the division-plates, and also to clear off any deposit in the bottom of the box; the rod working through a packed gland at one end of the box, fitted on the outside of the rising overflow-pipe, and a suitable size of stopcock to drain off from the bottom level any deposits requiring to be removed from time to time. It is advisable to have the connections so constructed that the inlet and outlet may be made reversible; and if the box is fitted with steam-pipes, no difficulties need be experienced at any time with stoppages or obstructions. To meet the varying makes of gas and the extremes of temperature, they may be constructed in batteries for use as occasion may require.

The annular form of condensers may have their votaries; but, from a practical point of view, the difficulties experienced by variations of temperature detract somewhat from their usefulness. Undoubtedly the best form for the effective regulation of

	Year ending April 30, 1904.		Year ending April 30, 1906.			
	Coal Gas Made, 697,900,000 Cubic Feet.		Coal Gas Made, 653,610,800 Cubic Feet.		Carburetted Water Gas Made, 62,341,000 Cubic Feet. Total Gas Made, 715,951,800 Cubic Feet.	
	Amount.	Pence per 1000 Cub. Ft. Gas Made.	Amount.	Pence per 1000 Cub. Ft Gas Made	Amount.	Pence per 1000 Cub. Ft. Gas Made.
Coal	£39,551 16 5	13·60	£35,330 9 3	12·99	..	..
Benzol	2,768 12 4	0·95	2,253 2 8	0·83	..	..
Gas oil	..	..	..	..	£2335 1 4	8·99
Coke	..	..	..	..	496 7 6	1·91
Breeze	..	..	..	..	74 3 11	0·28
	£42,320 8 9	14·55	£37,583 11 11	13·82	£2905 12 9	11·18
Less residuals—						
Coke and breeze	£8,402 18 8	2·89	£10,969 11 11	4·03	..	..
Sulphate of ammonia	7,603 11 1	2·62	8,197 5 0	3·12	..	..
Coal tar	5,088 6 2	1·75	2,906 14 2	1·07	..	..
Carburetted water-gas tar	..	..	..	..	£211 10 11	0·81
	£21,094 15 11	7·26	£22,373 11 1	8·22	£211 10 11	0·81
Net (less residuals)—	£21,225 12 10	7·29	£15,210 0 10	5·60	£2694 1 10	10·37
Purification (including material and labour)	2,298 14 7	0·79	1,779 3 5	0·66	197 8 3	0·76
Management and office charges	1,093 19 6	0·37	1,016 12 11	0·37	97 0 9	0·37
Wages, carbonizing	7,149 8 7	2·46	5,347 6 10	1·96	..	..
,, boilers and machinery	460 0 0	0·16	629 13 0	0·23	249 10 7	0·96
Repairs, labour and materials	3,605 16 0	1·24	2,549 12 0	0·94	83 18 11	0·32
Water	709 12 9	0·24	730 17 7	0·27	15 0 6	0·06
	£36,532 14 3	12·55	£27,263 6 7	10·03	£3337 0 10	12·84
Net cost	£36,532 14 3	12·55	£30,600 7 5	10 25	..	..

temperature is that known as the water-tube condenser. It also offers advantages where conservation of space has to be considered. In any form of condenser, I think it advisable to have the inlet and outlet made reversible; for the extra expense involved is more than compensated by the other advantages obtained.

I do not consider any works sufficiently well equipped unless they have ample exhausting plant at their command. I have often seen such plant installed which has been quite inadequate to that actually required, to say nothing of the prospective demands it may be called upon to meet from time to time.

One can imagine the depreciation on both engine and exhauster when they are required to work at a speed of (say) 250 revolutions per minute, and also the peace of mind of the party in charge when viewing his labours to overcome the necessary vacuum at a maximum period, with no duplicate to fall back upon in the event of a breakdown. I am afraid his dreams would be somewhat unpleasant, and his sleep wanting in that continuity which alone gives refreshing repose. Anyone contemplating the installation of retort-house governors will not derive the full benefit of their working unless he has ample power in his exhauster plant to create a greater vacuum than that formerly required.

It is now considered imperative that the regulation of the speed of the exhauster should receive more attention than that which is often given. This may appeal to anyone taking a diagram of the fluctuations of the vacuum on the exhauster inlet by the ordinary form of governing arrangements during 24 hours. From my own experience, I have found it impossible to obtain a minimum of fluctuation to within 3-10ths of an inch with the ordinary form of bye-pass governor installed. This can only be attained by stopping off the governor, and controlling the speed of the exhauster engine by a sensitive form of steam governor controlled only by the varying makes of gas. I have also found it advantageous to have the pipe to the governor taken from the hydraulic main, or as near to it as possible, of ample size, and so arranged that it may be cleared as occasion requires.

I have no desire to convert this paper into a presidential address by going through the whole gamut of gas manufacture, as time will not permit; but possibly some notes on the manufacture of carburetted water gas will be acceptable. In the initiatory stages, my experience did not differ from that of those who introduced the system, as several little difficulties of a technical nature presented themselves from time to time, which were soon got over. The plant was installed in October, 1904, and was erected by Messrs. Humphreys and Glasgow. It comprises two sets, each capable of producing 750,000 cubic feet of gas. The installation is fitted with two sets of De Laval turbines connected to Sturtevant blowers; the ordinary working speed of the former being 20,000 revolutions per minute, with 2000 revolutions on the blowers, the latter being reduced to one-tenth the speed of the turbines. At this speed on the blowers we are able to maintain a blast pressure equal to 20 inches in the water column.

No one who has not had experience of carburetted water-gas plant can realize with what ease, convenience, and confidence a manager is able to face his maximum period or a spell of fog or dull weather with such appliances at his command. He rather courts such contingencies from a knowledge that they bring in their train increased business.

It has often been remarked by some that they can make coal gas cheaper than carburetted water gas. This I do not deny; but, in making the comparison, allowance must be made for the higher illuminating value. Allow me to say that with an installation of carburetted water gas worked during the peak-load—say, from October to the beginning of March—the cost of the mixed gases will be less than if no carburetted water gas was made during the period named.

The above is a table of the cost for the year 1903-4, when no carburetted water gas was made, together with corresponding figures for the year 1905-6, when the carburetted water-gas plant was at work.

It will be observed that the net cost for the former period was 12·55d. per 1000 cubic feet, compared with 10·25d. for the year 1905-6. Against the difference in price must be placed the savings effected in the lessened cost for repairs on the retorts, the saving in carbonizing wages, and the larger quantity of coke saleable per ton of coal carbonized, due to all the retorts under fire being constantly at work, as noted below :—

	1903-4.		1905-6.	
	Amount.	Cost per 1000 Cub. Ft.	Amount.	Cost per 1000 Cub. Ft.
		d.		d.
Repairs on retorts	£3605	1·24	£2549	0·94
Carbonizing wages	7149	2·46	5347	1·96
		3·70		2·90
Coke and breeze realized per ton of coal for sale	9·25 cwt.	..	11·86 cwt.	..

In considering the table of costs for 1905-6, no credit can be claimed for lessened costs of material or wages, as they were lower during the former period. This requires to be borne in mind when making the comparison.

I do not consider this paper would be complete unless reference was made to a difficulty that is demanding the consideration of gas managers at the present time—viz., naphthalene. In the past, when cannel coals were more plentiful in Scotland, and were used to a greater extent than they are now, we only knew of this bugbear from the difficulties experienced by our contemporaries in England and in places where coking coals of a like class were used. The spirit of evolution has of late been active in the gas profession, caused by the changing condition of things, which has necessitated a larger use of coking coals in manufacture. The resultant gases naturally contain less solvent properties for naphthalene (which is present in all grades of gas) than that made from cannel coal. It may be taken as an axiom that the lower the illuminating power the less will be the vapour tension of the gas; consequently the gas loses its property of preventing the precipitation of the naphthalene.

Various remedies have been devised to meet this difficulty, such as—

(*a*) Modifications of plant, and the manipulation of same as regards temperatures.

(*b*) Spraying of the gas with hydrocarbon oil as it leaves the works, so that the naphthalene may be washed or precipitated out.

(*c*) Withdrawal or absorption of a portion of the naphthalene from the gas, so that at the lowest temperature the vapour tension will be such as to retain all the naphthalene that remains.

(*d*) Precipitation of the naphthalene in the gas in a liquid form by adding the vapours of a hydrocarbon having the same vapour tension as naphthalene so that when the hydrocarbon vapour condenses out, so will the naphthalene.

(*e*) Elimination of naphthalene by its absorption in creosote or other suitable oil, which also absorbs other hydrocarbons, and lessens the illuminating power of the gas. This may be prevented to a great extent by the addition of 6 per cent. or thereby of benzol.

From all the investigations and experiments I have made on the subject, I am convinced that the proper method for dealing with this difficulty is the elimination of the naphthalene by absorption in a suitable hydrocarbon oil; due care being taken to prevent the loss of other hydrocarbons, as noted under the last paragraph (*e*). With this object in view, I installed a Livesey washer of a size suitable for our requirements.

I purposed going more fully into this question; but, after having learned that a paper will be placed before you to-day dealing with the matter, I advisedly refrained. I have no doubt, however, that sufficient data will be given to provoke a good discussion, which I trust will be to the advantage of all.

Discussion.

Mr. J. Napier Myers (Saltcoats) rose, not to discuss the paper, but rather to thank Mr. Yuill, as he had interrupted him several times during the reading of it, for having come forward at very short notice. He begged to thank him also for the information he had given them.

Mr. J. W. Napier (Alloa) said they recognized in Mr. Yuill, not only an expert engineer, but also an expert financier—indeed, looking to the history of Mr. Yuill's connection with the gas industry, they were inclined to think that the finance department had been rather the most important part of his success. Regarding the retort-house governor which he had fixed, and which he (Mr. Napier) regarded as a thoroughly good thing, he might mention what was the amount of exhaust at the inlet to the exhauster, and also the difference of exhaust between the inlet of the governor and the outlet of the governor. This point was required, because he stated in another part of the paper that anyone contemplating an installation of these governors would need a sufficiently large exhauster. He mentioned the difference in cost between water gas and coal gas; and, referring to the tables for the year 1906, it was found that the amount received for residuals was quite 1d. more than in the previous year. This arose, perhaps, from the lessened cost per 1000 cubic feet of a mixture of coal and water gas. Then the lessened cost between the production of water gas *plus* coal gas, and coal gas alone, was simply owing to the collateral advantages they had heard of—viz., being able to keep retorts going steadily; there being less coke consumption; less wear and tear; less wages; and other charges being correspondingly affected.

Mr. P. B. Watson (Wishaw) asked if they could be informed as to the cost of introducing the governors.

Mr. W. Prince (Stoke-on-Trent) wished to be allowed to compliment Mr. Yuill on his paper, and to bear out, in every detail, what he had said about the excellencies of retort-house governors. He had had about eighteen months' experience with them; and he strongly recommended every brother manager to adopt some such form of doing away with that great "wish-wash" from the exhauster which was often found a considerable distance in the foul main and the hydraulic main. It was a matter they had to consider, sooner or later, if they wanted to maintain their dividends in these days of high rates for coal. Without doubt, at a cost of about £30, any man could increase his make of gas by something like 1000 cubic feet per ton of coal, and that with the greatest ease—with no attention, and with no trouble. He noticed Mr. Yuill had adopted the enclosed form of governor, as made by Messrs. Bruce Peebles and Co., who seemed to have got a step in front of others in this matter. His governor was shielded from the dust and dirt which collected in a retort-house. It was fixed on the top of the bench, between the two foul mains; and he had no trouble whatever in the working.

Mr. J. Napier Myers asked Mr. Yuill, in regard to the action of the governor, whether he had long enough experience of it to notice any effect it might have on the deposition of carbon inside the retorts. He himself had had long enough experience in making gas to realize the disadvantage of the deposition of carbon in retorts; and he had long held the opinion that the back-pressure, and the wishy-washy action of the exhauster, caused a shaking of the gas within the retort, and a certain amount of attrition of the gas. He had thought this was responsible, in some way, for the deposition of carbon. If the action of the governors would effect a steady and constant pull upon the gas, he would anticipate that it would likely militate against the deposition of carbon.

Mr. W. B. M'Lusky (Perth) asked if Mr. Smith, of Stirling, could give them any information regarding the results secured by his brother at Hawick.

Mr. J. D. Smith (Stirling) was afraid he could not, further than that, since they put in the governor, they were able to run up to 12,000 cubic feet of gas at the mouthpiece, which they never were able to do before within somewhere about 3000 cubic feet. In his own case, he had put in a retort-house governor, but had not yet started work with it. He, however, anticipated good results from it.

Mr. M'Lusky said he was told the other day that at Hawick they were getting 12,000 cubic feet; and it was very gratifying to have this fact corroborated. Hawick had always been celebrated for big mouthpiece yields per ton. He remembered getting the advice from Mr. Smith, of Hawick, "Draw clean and charge heavy;" and he was convinced that, if every gas manager ascertained that the stokers were drawing the retorts absolutely clean, and charging heavy at the back end, in the orthodox way, they would hear less about the deposit of carbon. They never found carbon where they had coke. They used to hear, in the old days, about the leaving of so much space, for heat waves and the like. The conditions to-day were totally different; and there was no getting away from the fact that the heavier they could get the charge the better, and also the less carbon there would be. This was, of course, away from retort-house governors; but it related to practical working, which was Mr. Yuill's theme. It was also a point, in connection with any new plant, that they had to take into account not only the benefits to be derived from the plant, but the advantages obtained from the attention they gave to it, in their endeavour to see that it gave the return expected. He had no doubt that where retort-house governors were introduced, greater attention would for a time be bestowed upon working. He had everything to say in their favour; but he had no records of any increase in the yield of gas per ton of coal carbonized. It was rather early yet, perhaps, to take tables and minutes in regard to this; but at the present time he had no knowledge of any increase in the yield of gas per ton. Apart altogether from this, however, he was convinced that the retort-house was not right, however small it might be, without a retort-house governor. It was not a question at all of £ *s. d.*, but of efficiency. They simply could not regulate the result without a retort-house governor. The exhausters at Perth were as perfect as it was possible to make exhausting plant; and if any gas-works could run along without a retort-house governor, it was in Perth. The regulators there were so sensitive that on a Sunday morning, when the stokers were putting off retorts, the exhausters actually slowed down themselves and stopped at a dead-centre; and if the exhausters were put to dead-centre on Sunday evening, they would start again, and regulate themselves. But they had the other matter, notwithstanding, of the area; and this was where he would like to retract a former statement. In spite of all the ample area, this area was fixed; but the quantity of gas they made, from hour to hour and minute to minute, was not fixed. It was variable; and if they had plant adjusted to take off a certain yield, they could set their exhauster to do this work, and it would do it, at the exhauster-house. But when they had a large increase of yield at a particular moment, and a correspondingly large accession of pressure or reduction of pull in the condensers, then they had their gauge altering in the retort-house; and this was why the retort-house governor was a success.

Mr. J. Hepworth (Edinburgh), in explanation of one or two points which had arisen, said it might interest them to know that the retort-house governor was introduced more than twenty years ago, and by the firm of which he was now a member. Few people out of London then cared to consider it; but it had been in use, in more than one place away from London, for a long time. The London engineers, he was told, preferred to have it without a cover; and so it was made without a cover to suit them. But for a long time past now, the governor had been made both with or without a cover, as the buyer might determine. With regard to the inquiry about carbon, probably Mr. Yuill would tell them that his experience had not been very extensive—he told them so in his paper—and that he had, therefore, not had time to determine whether or not the use of the retort-house governor induced a large deposit of carbon; but he knew perfectly well what Mr. Yuill's experience would be twelve months hence. There would be no increase in the deposit of carbon; the tendency was in the other direction. Some gentlemen had mentioned that a retort-house governor was sure to increase the make of gas per ton of coal. If a man, however, was getting 12,000 cubic feet per ton, he did not see that he could have much of an increase; but everybody was not making that. What he would like to say, further, was that a retort-house governor gave them absolute freedom from anxiety as to illuminating power. They could go to bed knowing that, whatever might happen in the retort-house, their gas would not be interfered with, because the governor would take care of it. There were other matters in connection with it, as to which this, of course, was not the time to speak, but upon which everybody interested in it would take opportunity of informing himself, as time went on. He (Mr. Hepworth) had been extremely interested in what he had heard that day.

Mr. Yuill said he felt honoured by the intelligent way in which the members had criticized his paper, because he always felt that there was nothing like a good criticism to draw out the facts; and it made the matter much better understood sometimes to the audience than if there had been no discussion. Mr. Napier Myers raised the question as to the pressure at the inlet to the exhauster, and at the inlet to the governor and on the hydraulic main. With reference to the exhauster, with the old form, before he

started the governor, he generally worked with 15-10ths, so as to give a slight pull on the hydraulic main to overcome the seal he had, which was about 1 inch. But since he started the governors, he had had to increase the pull; and he found they worked much better with double the exhaust he had before—that was, 30-10ths on the exhauster. In his paper, he mentioned, in speaking of exhausters, that they would require to bear in mind, if they contemplated putting in governors, that they must see that the exhausters were capable of doing their work, because they would never do their work with an exhaust of only 2-10ths to work the governors. They must always have an excess of pull, so as to make the governors more sensitive. The 30-10ths was reduced to about 25-10ths at the governors—the difference being caused by the friction in passing through the length of pipe, and in the hydraulic main itself. The gauge in the hydraulic main stood at level; and it was maintained at this during the whole twenty-four hours. If there were any variation, it did not exceed 1-10th; and he could corroborate Mr. Hepworth that they could go to bed and feel sure that it would not have altered before the morning came. Undoubtedly a light seal did give them a saving in the hydrocarbons. He thought they understood the point that, with the governor, they were able to keep the seal at such a low level as they never could have risked before with the fluctuation on the exhaust. Mr. Myers also went into the question of the savings in the carburetted water gas. Those who had had experience with carburetted water gas would understand where these savings came in. There was a saving in wages and in coke. The difference was 0·8d. per 1000 feet. This, taken over a whole year, with him, would come to about £2400. Mr. Watson asked as to the cost of the governors. Considering the years they would be in use, their cost would form no criterion. He was very pleased to have Mr. Prince's corroboration of his experience with the governors. He had no fear that anyone who had had experience with retort-house governors, would not have the same sort of feeling as he had, which was—"I wish that I had known of this earlier." With reference to the deposition of carbon, he thought they now understood the principles which governed the action of the gas in the hydraulic main; and they would understand that if they lessened the pressure of gas on the retort, and also lessened the pulsation of the gas, they were doing all they possibly could to lessen the deposition of carbon. He had not as yet had such a lengthened experience as to enable him to determine as to this; but he thought that, if they considered the circumstances under which he now worked, as compared with what he previously did, they were all in favour of lessening the deposition of carbon. Mr. M'Lusky had had these governors erected; and while he had nothing to say on the subject, he, as he always did, had given them very valuable information. The fact was that Mr. M'Lusky could give them more valuable information than he (Mr. Yuill) could, because he had had them longer at work; but still, he thought, Mr. M'Lusky had corroborated what he had said.

INTRODUCING GAS TO A NEW DISTRICT.

By James Campbell, of Polmont.

[A Paper read before the North British Association of Gas Managers, July 25.]

It seems a very hopeful sign for the gas industry when we occasionally read in our Technical Journals of the erection of works for the supply of gas to new districts, as, while most of these districts are undoubtedly small, this only serves to show that gas is still a necessity, and that the many advantages of a gas supply are now being realized to a greater extent, and by even the smallest communities. In the writer's experience with such a new district, it was instructive to hear the views expressed by many residents as to the desirability or otherwise of having a gas supply. Many of them wondered how any company would venture to start a gas-works at this time of day, as, according to them, electricity was now the correct thing and the only medium for up-to-date lighting. Some feared that with our price (4s. 2d. per 1000 cubic feet) only a certain class could afford to use gas, and that its employment would accordingly be limited.

It was quite evident that the "take-it-or-want-it" attitude of gas companies of former days had made a certain impression, even on a district where there was no gas supply; and there was also a certain amount of scepticism regarding our statements as to what could be done by means of gas. Hence our first duty lay in dispelling the prevailing ignorance as to the capabilities of gas, and in showing practically what could be done by incandescent lighting.

When the works were nearing completion, a circular was issued stating when the Company would be ready to supply gas, and also giving the conditions under which a supply could be had. It is very necessary in the case of a new district to give special inducements to probable consumers, as in many instances the cost of installing gas would be sufficient to prevent the securing of a customer. It was found that the cost of the service-pipe would prove a hindrance, as a water supply had been recently introduced. These services had to be paid for by consumers all the way from the water-main to the house; and there was an impression that the same conditions would apply to gas. It was therefore decided to lay service-pipes free up to 25 feet beyond the line of the street; pipes beyond this distance being laid by the Company and charged to the consumer at cost price. A special point was made of this in the circular. The extra capital cost thus caused was comparatively small, and the concession proved of great advantage. The other conditions in our circular were: Ordinary and prepayment meters, with stopcocks, supplied and fixed free; no meter rents; gas company undertake internal fittings work, and supply backets, burners, &c., at lowest rates; cookers fixed free and hired at low rentals. It was pointed out that, under these conditions, most houses would have their service-pipes laid and meter supplied and fixed free; and then some information was given as to the cost of gas lighting. The result of a liberal distribution of this circular was the receipt of one application for a gas supply.

The area supplied, which comprises four distinct villages, has necessitated the laying of fully 6 miles of mains, crossing on the way seven railway and canal bridges. Part of the district is mining villages; but most of it contains cottages of a good class and owned by those residing in them. Doubtless it may be asked why high-pressure mains were not put down in such a district. This was fully considered before the mains were laid, but it was ultimately decided to lay two 6-inch pipes from the works, each of them supplying two villages. Though the villages are distinct, we have customers all the way; but none of these had any use for a supply at high-pressure direct from the main. Immediately we had made a quantity of gas, and before it was turned on to the mains, we fitted up a Humphrey lamp outside our retort-house, as a light placed there could be seen from a considerable stretch of roadway. This proved a splendid advertisement, and was quite a revelation to most people as to what could be done by incandescent lighting. Then about this time we were fortunate in securing the contract for the street lighting of one of the villages in our district; and 26 lamps, all with incandescent burners, were erected and gave great satisfaction. This, in conjunction with the lighting at the works, brought prominently before the public the superiority of gas lighting.

Orders now began to come in more freely; and it was quite evident that our advertisements were the houses we fitted up and the light that was supplied. People visiting houses where there was a good incandescent burner could hardly fail to be struck with the difference between the light thus given and that emitted by an oil-lamp. This led to inquiries being made as to cost of gas lighting and the cost of introducing gas into a house. When an inquiry was received, the writer visited the inquirer personally; and the method of dealing with a probable customer was this: All information was given as to cost of lighting. It was pointed out (if the house was within our free supply distance) that the supply was brought into the house and the meter fixed without any charge. Then the house was measured and the quotation given, which included everything except brackets, burners, and glass. The prospective customer was then invited to our show-room at the works to make a selection from our stock of brackets, &c., there; and the price of these, added to the estimate given, enabled the customer to know exactly what the work would cost. If a customer could not conveniently come to our show-room, then either a selection of brackets was sent to his residence, or along with our offer approximate prices were given for suitable brackets. It has been to our advantage to deal thus with customers in letting them know exactly what their house fittings would cost, and so preventing any misunderstanding, as they came to know they could rely on the statements made, and a feeling of confidence was established both with regard to fitting work and gas supply.

Our station-meter house was fitted up as a show-room. This has been of great service to consumers, as we have always a good stock of fittings, and several brackets and pendants connected to the gas supply enable us to show brackets, burners, and glassware to advantage. We have also cookers, fires, &c., connected up, so that practically every requirement in an ordinary household may be exhibited. Even the smallest gas companies can profit by having a show-room. This need not necessarily be open continually. In our case, the writer asked prospective customers to advise him when they would call, so that he could meet them personally. But, in any case, with the show-room at the works, there is always someone about who can show the stock.

No definite rule as to profit from fittings can well be laid down in the case of a gas company doing gas-fitting business, as each application must be considered on its merits. In the Polmont district, cases have arisen where only a limited amount of money could be spent on fittings; and then the Company did the utmost for that sum—doing the work, if need be, at cost and being repaid by the gas consumption thus gained. In most instances, however, a moderate profit can be made on the work, and the consumer still have the fitting done at considerably lower rates than are charged by plumbers. Our men fitted up well over 200 houses and shops last winter.

There is a great advantage in introducing a gas supply to a district where none of the houses are fitted for gas, and where the gas company can manage, as we did, to fit up fully 95 per cent. of the houses where gas was introduced. Ample pipes are laid on, provision is made for a cooker or fires being subsequently required later, and only approved incandescent burners and mantles are employed; the result being that we have wonderful freedom from complaints—a proof, if any were needed, that it is seldom the gas is really to blame, but more often the fittings,

when there is cause for complaint. An instance came under the writer's notice recently in his district, where a plumber fitted up a workshop with five flat-flame burners. The pipe leading from the meter was a ¼-inch iron one; the result being "bad gas." In some cases where consumers wished to employ their own tradesmen to do the gas-fitting, the writer prepared specifications for the work, and advised as to the placing of the lights. That this has been successful is evidenced by the fact that practically every new consumer now comes to the gas-works for information regarding the gas-fitting of his premises. With new premises it has been of advantage to see the proprietor and arrange for pipes of sufficient size were laid, and provision made for probable cooking and heating appliances.

No inconsiderable trouble was caused by mantle breakages when first the supply was turned on, as the consumers had not been accustomed to handling such articles. Some even declared that it cost them nearly as much for mantles as it formerly cost them for oil. When, however, one could point to the street-lamps—where, by the way, the mantle consumption was only two per lamp from October to May, as we had a specially good wind-proof lantern—and show mantles that had been in use for quite a long time, this helped to convince them that the cause of the breakages could easily be traced to the handling of the bracket. In such cases, a mantle given free and properly fixed goes a long way in satisfying new consumers. Then, again, there was some trouble through consumers shutting off the air supply to burners "in case the gas would escape." But, of course, such complaints as these were easily remedied. Still, they serve to show some of the difficulties with consumers who have had no previous experience with gas.

As the result of experience in such a district as ours, with new mains, ample interior fittings, and good incandescent burners, we find that we require to give a pressure of about 25-10ths at the consumers' premises to ensure satisfaction; and over the greater part of last winter we did not reduce our pressure in the day time. One reason for maintaining such a pressure during the day was that, when burners were fitted and the gas supply adjusted during the day time, they were unsatisfactory in the evening—necessitating their being attended to during lighting hours. It is interesting to note that a large percentage of the incandescent burners used are of the inverted type, and they have generally been very satisfactory.

When first surveying meters, the writer found that many consumers were disappointed with the cost of their lighting, though all were highly pleased with the light. But he made a point of telling them what their cost was per day and per week. This almost invariably was an agreeable surprise, and led to consumers recognizing that, after all, incandescent gas lighting was as economical as oil, and certainly more convenient. He also cleaned burners, fitted on mantles, advised as to the use of cookers and such like, and by this means kept in touch with consumers' requirements. This constitutes an advantage for the manager of a small works over those in charge of large ones, as, by these visits, he knows nearly every consumer personally; and the personal element is of considerable value. It was found that a large number of consumers had been using their cookers improperly—such as placing pastry, &c., on top of the browning shelf, and, consequently, having the food burned on the bottom and uncooked on top; but having been shown the correct method, there was satisfaction afterwards.

There is no doubt that it would be to the advantage of gas companies generally to employ trained lady lecturers to visit consumers' houses and show them the proper and most economical methods of using a gas-cooker, as though its use is thoroughly explained at an exhibition, consumers fail to carry with them many small details that make for successful working. It is of interest to note that as incandescent lighting came to be generally used, the requirements in lighting were immediately raised—people who were formerly satisfied with the light of an oil-lamp being dissatisfied unless their incandescent gas-burner was at its best. Then, again, consumers had cookers fixed, and before many days elapsed found them to be indispensable, although some of them had never seen a gas-cooker before.

To make our services indispensable has been our aim; and this, coupled with the assurance that we have made no exaggerated claims for gas, has resulted in our getting, and keeping, a goodly number of customers. Our works were only started last October. Since that time we have connected up 250 consumers, and fixed over 100 cookers and grillers and 4 gas-engines; and still the demand shows no falling off. Such mains as were laid before the gas was turned on were tested by means of air at a pressure of about 2 lbs. per square inch. Suitable plugs were placed in the ends so that the air would be easily expelled when the gas was turned on; and after the first two or three days no further trouble was experienced with air in the pipes. It was noticed, however, that for a very considerable time the gas had a faint and not unpleasant smell—in fact, it is only now, after ten months' working, coming to have a real "smell of gas." There was also for the first few weeks an apparently heavy leakage; but this steadily diminished. These facts, taken together, seem to point to some absorption occurring—presumably either the iron pipes or the coating material being the cause. Before the mains were laid, we generally asked prospective customers whether they would require a supply; but very seldom could we get sufficient encouragement to induce us to lay a pipe in particular places. However, in spite of this, mains were put down; and in all cases this has been justified, as invariably, after the pipe was laid, we secured people as customers who previously would not commit themselves to take a supply.

In conclusion, some instances may be given as showing that the methods adopted have been successful, more especially with regard to competition from the electric light. A large firm, at the head of which was expert chemical and mechanical knowledge, and where working costs were taken out very closely, formerly made oil gas and generated electricity for the lighting of their works. After going thoroughly into the matter, they decided on taking a supply of gas from our mains, both for lighting and for manufacturing purposes. Another firm, generating electricity on their premises for lighting purposes, and regularly using over 100 lights, have now decided to entirely dispense with their electric plant and instal incandescent gas lighting; and this mainly as a result of seeing the lighting of other premises and comparing it with their own. In a workshop where a 25 B.H.P. oil-engine was working, we managed to have it replaced by a gas-engine (the gas for which is supplied at 3s. 4d. per 1000 feet); and now, after several months' working, the owners are perfectly satisfied. Such facts as these are our best advertisements.

Discussion.

The PRESIDENT remarked that the subject of the paper was one which appealed strongly to many of the members; and there was a great deal of interesting matter in it.

Mr. A. WADDELL (Dunfermline) said that Mr. Campbell was one of their newest members; and this was, therefore, his first paper. He considered he had made a very good commencement indeed; and he hoped they had in him a man who was capable, from time to time, of giving them an interesting paper. Mr. Campbell had had the total erection—all the engineering and the management—of the works he was now serving in. He had, therefore, had a very unique experience. He had erected the works; he had opened up all the books of the business, and kept them; and he had had to deal with all the points he had brought before them that day, of how to put the gas before consumers. Mr. Campbell had succeeded even beyond anything that he anticipated when he began. He believed that he had more than satisfied his consumers also, even with gas at a comparatively high price; and he had been able to supplant one or two oil-engines, and get a pretty large customer in that way. He had also been able to supplant electric lighting in a co-operative store, where they had been generating electricity for themselves. Altogether, he had met with very considerable success in the opening up of the new works at Polmont.

Mr. D. ROBERTSON (Dunoon) congratulated the author. It was not very often that a young man came forward and read a paper giving experiences such as Mr. Campbell had had at Polmont. It was a very interesting experience for a man to go into a new works—quite different from going into a works where half-a-dozen men had been working before him. There was one very interesting point Mr. Campbell had mentioned, that was the great apparent leakage which took place at the beginning of the supply. Of course, this was because the pipes absorbed gas before they were thoroughly saturated. There was another point—the peculiar smell the gas had. This he considered was due to the coating of the pipes becoming dissolved and being carried forward with the gas. He thought the success of the undertaking was very much owing to Mr. Campbell.

Mr. A. REID (Brechin) had enjoyed Mr. Campbell's paper very much. It occurred to him once or twice that it was papers like this which the vast majority of their members required. In Scotland there were very few of them who could hope to get into large works, because not many large ones existed. The Association was mostly made up of men in small works. A paper like Mr. Campbell's was, therefore, very helpful to them, because most of the members had to come into daily contact with their customers. The paper showed them how to meet their consumers, and let them see the proper way to use the product they were getting from them; and it was one which, he was certain, they would all profit by. In regard to the competition Mr. Campbell had had, and his being able to supplant electric lighting in one or two instances, some of them were very glad to hear this. He (Mr. Reid) was standing between two gentlemen from towns which, like his own, were supplied with electricity by one electric corporation. He referred to Montrose and Inverness. Either of them could give the meeting his views in regard to that corporation. He read a paper two years ago on the competition they had; and he was glad to say that they were now in a much stronger position than they were then. It was not so much electricity they had to fear as oil.

Mr. J. M'FARLANE (Maybole) thought that Mr. Reid had said everything which could be said on behalf of young men. He himself did not go into a new district by any means. He went, some years ago, into a town where, for some remarkable reason, gas was looked upon as being too antiquated for anyone to use, and far too dear at 4s. 7d. per 1000 cubic feet. One of the things they did was to shorten the quarters, thereby making the accounts smaller; and this helped considerably. Three months before he went to Maybole, there were 470 consumers; now there were 820. There were three factories using electric light. They were there before he went; and he had been told by the proprietors that if they had to do it again, they would not have the electric light. Their pride, however, more than anything else, was at stake; and he could not get them to climb down. But the electricians were

at another factory, which he had fitted with incandescent burners. The cashier in this factory was really too sharp for them. He asked them if they could light the place better than it was; and the electricians then saw that they had a man to deal with who knew what he was talking about. They said "no." The cashier then asked if they could do it cheaper; and they again said "no," and the cashier told them he would not have their light. They had incandescent burners in every church in the place, in all the street-lamps, and in almost every house; and there was certainly not 20 per cent. of their consumers who had not cooking appliances of some sort. All these things had had the effect of enabling them to reduce the price of the gas, which, after all, was the best means of increasing the consumption.

Mr. A. Wilson (Glasgow) characterized Mr. Campbell's paper as a modest record of good work well done. The lines the author had gone on were, he thought, equally applicable to large as to small undertakings. The personal element came very much into play in both cases. Any amount of circularizing, issuing of pamphlets, and the like, bore not the slightest comparison to a good man going round telling an unvarnished tale regarding the excellent results to be obtained from gas efficiently used. There were troubles they were apt to get into, sometimes, by sending a man round who did not know his business. Such a man often did more harm to the gas business than they thought of. They should give instructions to their men, where they did not go themselves, that they should just promise what they could actually perform—rather under than over, because they could always give good value to the public for what they charged. The record Mr. Campbell had given was unique in its way. He did not think he ever saw, in the proceedings of any of their Associations, an account of the starting of a gas-works, and of the management of customers, such as Mr. Campbell had laid before them. The author was to be congratulated, not only on the paper he had given them, but also on the way he had carried on the works; and he was sure that if Mr. Campbell went on in the way he was doing, he would have a large increase of his business before very long.

Mr. Campbell, in reply, said he was very pleased at the reception that his paper had had; and he thanked the speakers for the remarks they had made.

REGISTER OF PATENTS.

Indicating Mechanism for Test Gas-Meters.

Milne, J., and O'Connor, H., of Edinburgh.

No. 14,649; June 27, 1906.

In their specification the patentees say: It has been found useful to ndicate on test gas-meters the cost of the gas passed through in a given period; and to enable this to be done with the gas at different prices per 1000 cubic feet, it was proposed, in patent No. 6233 of 1896, to indicate it by means of mounted step-wheels into which change-wheels of various diameters could be geared so as to suit certain varying prices of gas consumed. In the present invention, however, without the use of step-wheels, a change-wheel in the train of wheels connecting from the crank of a dry meter, or from the spindle of a wet meter drum to the spindle of the pointer, is employed to show the cost; so that, by varying this change-wheel according to the price of the gas, the cost indicated for a given quantity will directly follow the price per 1000 cubic feet. The change-wheel to be used has either a crown-wheel gearing into a pinion, or a wheel having the periphery upon which the teeth are cut of sufficient breadth to enable the teeth of the crown-wheels of the required different diameters to engage, or ordinary toothed change-wheels could be used, the axle of which could be moved and fixed in such a position as to enable wheels of the required different diameters to engage with the wheels of the train.

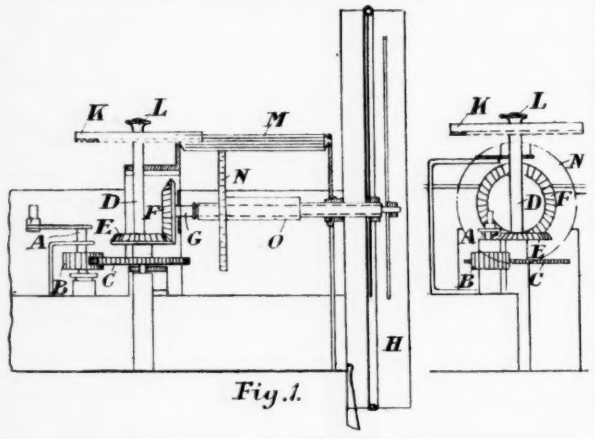


Fig. 1.

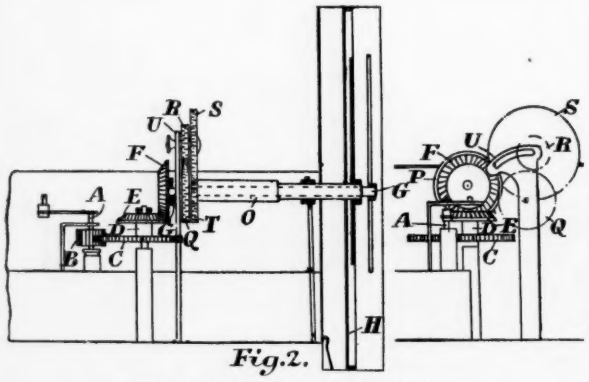


Fig. 2.

Milne and O'Connor's Test Gas-Meters.

Fig. 1 shows the invention as applied to a dry meter. A is the crank-spindle to be actuated by the passage of the gas through the meter. Upon this a wheel B is fixed gearing into another wheel C, fastened upon a spindle D which carries a bevel-wheel E gearing into another bevel-wheel F at right angles. The axle G is carried right through to the front of the dial H, and has upon it a pointer indicating the quantity of gas passed. Fastened to the spindle D at its upper end is a crown-wheel K, fastened by means of a thumb-screw or nut L. This crown-wheel gears into a pinion M, which, in its turn, gears into a wheel N on an outer spindle O, through which passes the spindle D. On the spindle O is another pointer, indicating on the dial H by another circle of figures the cost of the consumption shown by the pointer on the axle G. The greater the number of teeth in the crown-wheel K, the quicker will the pinion M revolve, and with it the wheel N, spindle O, and its pointer; so that the price indicated will be greater the larger this crown-wheel. The pinion M being placed radially to the centre of the wheel K serves for any diameter of wheel within the limits of the length of the pinion M, so that a change can be immediately made as required. It is preferred to make the gearing so that each tooth upon the crown-wheel represents 1d. per 1000 cubic feet; so that a thirty-tooth wheel is used when the price of gas is 2s. 6d.

Where the mechanism is to be used with a wet meter, the wheel B is fastened to the upright spindle driven by the passage of the gas through the drum of the meter—the mechanism otherwise being as above described.

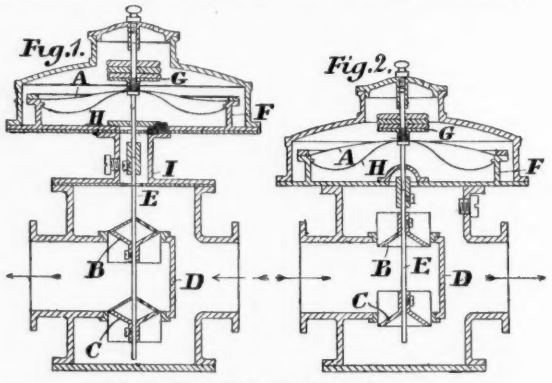
In fig. 2, an alternative system is shown where ordinary toothed change-wheels are used. On the back of the bevel-wheel F is fixed an ordinary toothed wheel P gearing into another wheel Q; this again gearing into another wheel R, the axle of which is arranged so that it can move in a circle at a constant distance from the centre of the wheel Q, so that the wheel R is always in gear with the wheel Q. The axle can be moved nearer to, or farther from, the wheel P, so that the change-wheel S, which is fixed upon the axle of the wheel R, may be brought into gear with the wheel T on the outer shaft O carrying the second pointer, as described for fig. 1. A lug is fastened to the axle of the wheels R and S so that it can be clamped with a quadrant U by a thumb-screw in the desired position.

Governors.

Thorp, T., of Whitefield, Lancs.

No. 22,134; Oct. 8, 1906.

This gas-governor is designed with the object of maintaining a more uniform pressure than with the diaphragm form of governors hitherto used, and to facilitate the cleaning of the valves and valve casings.



Thorp's Foul-Main and Station Governors.

Fig. 1 represents a foul-main governor, and fig. 2 a station and main governor.

The pressure regulating device of the governor consists of an equilibrium valve (connected to a weighted flexible diaphragm A) formed of two conical discs B and C of the same diameter, and guided by means of wings in rings fixed in the top and bottom of the internal chamber D of the valve casing, which is arranged, as usual, with branch pipes leading respectively to the internal chamber between the valves and to the external casing, and communicating with the space above and below the valves. The valve discs are fixed separately on the spindle E by set-screws so as to adjust their distance from one another; and the spindle is detachably connected to the diaphragm A, so that, after it is disconnected, it can be drawn out with the valves through the bottom of the casing to be cleaned without disturbing the diaphragm.

The diaphragm is fixed to the flanged open top of a short cylinder F, by a clamping ring and bolts (not shown); and the spindle is connected to it by means of clamp washers. The spindle carries a tray G for the weights used for loading the diaphragm to suit the desired pressure. Over or under the diaphragm a blade spring H, as described in patent No. 5791 of 1905, is arranged to assist the weights in pulling the diaphragm downwards. The pull of the spring H decreases as the

diaphragm A rises, and thus counteracts the increase of downward pressure resulting from the stretch of the diaphragm. Thus the latter rises and falls with a very small difference of pressure. The spring may also be arranged to press the diaphragm upwards with an increasing pressure as it rises, which will have the same effect. The diaphragm is preferably made of several plies of proofed canvas or of oxidized oil sheeting.

In the case of station or main governors for cold gas, the bottom of the cylinder F can form the cover of the valve casing, as represented in fig. 2; while for foul-main governors, regulating the flow of the hot gases from the retorts to the exhauster, a separate cover having a central pipe I with a flange on top for fixing the cylinder bottom is preferred, as represented in fig. 1. Asbestos washers prevent conduction of heat from the valve casing to the cylinder F. The gas contained in it therefore, after it has once cooled down, will remain cool, as no further appreciable quantities of hot gas will enter it—thus protecting the diaphragm A against the effect of the heat.

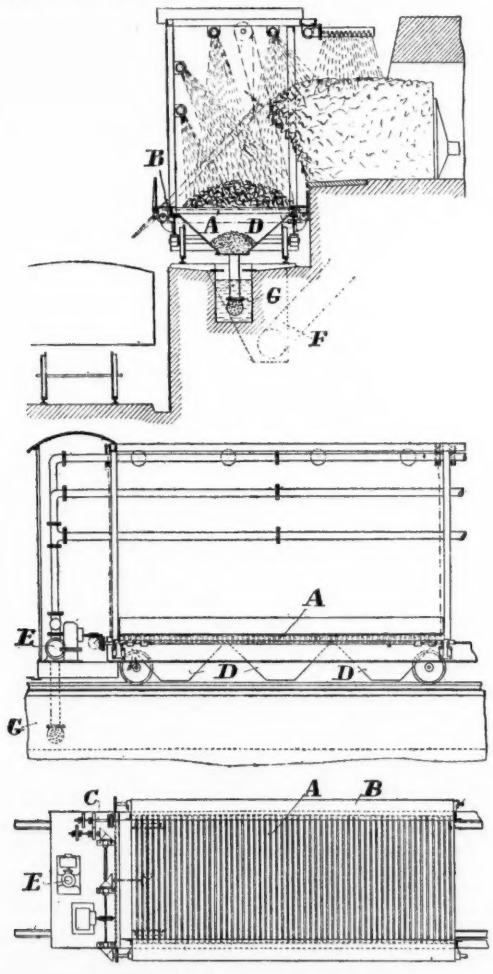
The branch pipe of the casing leading to the space above and below the valves B C, and communicating with the diaphragm cylinder F, is connected to the part of the main in which the pressure is to be kept constant. Thus in station and main governors (fig. 2), the outlet is connected to the delivery mains and the gas admitted through the inlet branch between the valves, which are so set that they open downwards and become closed when the diaphragm rises as the pressure in the delivery main increases. In foul-main governors (fig. 1), the inlet is connected to the foul main and the outlet to the exhauster—the valves being so set as to open upwards and close when the pressure in the foul main decreases; the valve spindle E being prolonged downwards, so as to come against the cover when the valves are fully closed and preventing their being opened downwards. By this means "the pressure in the main and the retorts is kept normally constant, and the danger of air being drawn into the main when the exhauster races is prevented."

Quenching, Screening, and Conveying Coke.

SCHUMACHER, W., of Düsseldorf, Germany.

No. 14,964; Jan. 30, 1906.

This invention relates to apparatus for quenching, screening, and conveying coked coal from ovens or retorts.



Schumacher's Coke Quencher and Screener.

The arrangement adapted to coke-ovens is as follows: In front of, and lower than, the ovens on the quenching side is a track on which the screening and conveying apparatus is arranged. This apparatus is provided with a motor which actuates one spring-shaft and two laterally arranged shafts by means of wheel gear. On the conveying apparatus, at the bottom, is a grating A constructed with movable bars, one half of which can be raised and lowered, while the other bars remain stationary. This raising and lowering are effected by the shafts already referred to, eccentrics on which engage directly below the bars which are to be raised; but those which are not raised are connected by frames like the frames B, so as to be raised or lowered by the eccentrics which always execute the same movement on both shafts. For the raising, ropes or chains are employed which wind on drums of a shaft C that can be actuated either by hand or motor. Below the track, hoppers D are arranged to be opened and shut by slides or the like. The device is provided with a pump E in communication with a suction pipe and with pressure pipes, on the latter of which nozzle pipes are arranged. The suction pipe dips into a channel open above, and runs between the travelling rails; and when the device is moved, it always remains in communication with the water. At one or both ends of the track, or at some other place, are pits F, which can be furnished with elevators or the like.

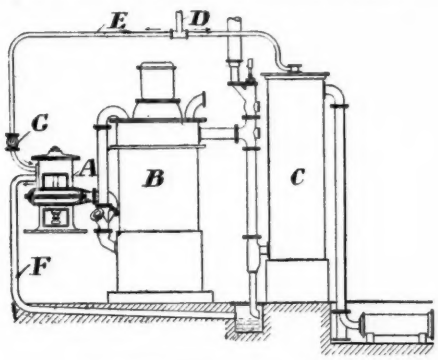
The action is as follows: When the grating is in a horizontal or in a slightly inclined position, the charge of one of the ovens is pushed on to it; and during the discharging of the coke from the oven, the pump, and thereby the spray pipes, are operated. During the discharge and the quenching, the movable grating bars are raised and lowered, whereby the material lying on them is set in motion, and the small coke falls through the bars into the hoppers D, whence it may be conveyed into the pit F for further treatment. The water necessary for the quenching is pumped out of the channel through the suction pipe and conveyed to the water-conduit; and all water that is not evaporated flows through the perforated sides of the hoppers D back to the channel G, where it filters down and is again used.

Suction-Gas Plant.

KÜNZLER, A., and SCHNEIDER, F., of Konstanz, Germany.

No. 7405; March 27, 1907.

The starting of suction-gas producers has hitherto been effected, the patentees remark, by clearing the generator and fanning or blowing the fire until gas flowing from a test or pilot burner burns with a flame of a certain colour. Then the connection to the scrubber is made; the chimney valve closed; the generators filled to the rim of the feed hopper; and the latter closed. Thereupon the producer is started. Only in the case of very large engines (of over 200 H.P.), where electric current is usually available, the fan or blower is actuated by an electro-motor for blowing the fire, which usually requires half-an-hour or more. In the case of smaller engines, hand fans or blowers are almost exclusively used, so that two men are required for starting the producer—one to operate the hand fan or blower, while the other performs the other operations required. The present invention relates to means by which the starting can be effected by one man in cases where electric current or an electro-motor is not available.



Kunzler and Schneider's Suction-Gas Plant.

As shown, there is provided, instead of a hand fan or blower, a hydraulically operated fan A—a type of plant which can always be used with advantage instead of blast apparatus not mechanically operated, provided that water at a pressure of approximately three atmospheres is available. In all suction-gas plant water under pressure is used for wetting the coke in the scrubber C, so that a water-pipe E, leading to the blower but normally closed by a cock G, can be connected to the supply pipe D.

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16,658.—DARRAH, H. M., and MARTIN, J., "Gas-fittings." July 20.
16,737.—BUSH, A. W., "Taps or valves." July 22.
16,768.—WOOLLEY, A., "Gas-producers." July 22.
16,785.—BROWN, BOVERI, & CIE. AKT-GES., "Jet-condenser plants." July 22.
16,820.—HANNAN, J., "Application of gas for the generation of power." July 23.
16,855.—DAWES, T. J., "Locks for manholes of mains." July 23.
16,862.—HARE, A., "Automatically operating gas or other valves at predetermined times." July 23.
16,867.—SÜSSMAN, H., "Incandescent mantles." July 23.
16,890.—MONSEUR, A., "Gas-furnaces and the like." July 23.
16,937.—BOULT, A. J., "Gas-generators." A communication from Akt.-Ges. Gorlitzer Maschinenbau Anstalt u. Eisengiesserei. July 24.
17,020.—JONES, T., "Gas for power purposes." July 25.
17,044.—COHN, S., "Mantles." July 25.
17,113.—KIKUT, E., "Gas-engines." July 26.
17,153.—BROWNE, A. F., "Discharging continuously working vertical retorts." July 26.
17,154.—BLANC, E. E. P. M., and CATON, P. A., "Manufacture of illuminating gas." July 26.
17,174.—BOULT, A. J., "Charging gas-retorts." A communication from the Compagnie pour the Fabrication des Compteurs et Materiel d'Usines à Gaz. July 26.
17,176.—BENNETT, G. S., "Steam-blast gas-burners." July 26.
17,252.—JAUBERT, G. F., "Gas-generators." July 27.

THE GASLIGHT AND COKE COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held last Friday, at the Chief Office, Horseferry Road, Westminster—Mr. CORBET WOODALL (the Governor) in the chair.

The SECRETARY (Mr. H. Rayner) read the notice convening the meeting; and the seal of the Company having been affixed to the register of proprietors, the report and accounts (which were given in the "JOURNAL" last week) were taken as read.

THE REPORT AND ACCOUNTS.

The GOVERNOR: Ladies and gentlemen, before moving the adoption of the report and accounts, I have a few observations to make upon them, and upon the position of the Company. You will doubtless agree with me that the report shows the Company to be in a prosperous condition; the accounts proving that the advances and economies in manufacture to which reference has been made at recent meetings are fully maintained. The capital account, due partly to the operation of the redemption fund, is less in amount now than it was at the end of last year, and the charge for dividend and interest per 1000 cubic feet of gas sold is appreciably reduced. The actual expenditure for capital purposes amounted in the half year to £54,317; and the credits in respect of depreciation of plant, meters, and stoves, to £53,444. The increase in the latter item is explained as follows: When in 1894 the Company started fitting up small houses with automatic meters for the benefit of the poorer class of consumers, it was arranged, with the sanction of the Government Auditor, that the cost of pipes and fittings inside the houses should be charged to a suspense account rather than to capital. Now, however, as was explained to you at the last half-yearly meeting, this suspense account has been completely liquidated. It has been decided by the Directors to show in the revenue account the amount received through the extra charge made to the automatic meter consumers for the use of fittings; and you will now see on the credit side this amount entered for the first time as "Rental of fittings, £58,545." This is after the deduction of a small proportion which is treated as stove-rental, and is included under that heading in the same account. On the other side, the charge on account of fitting up additional automatic meter supplies will be found entered under the item "Gas-fittings, including labour (automatic meter supplies), £29,258 2s. 10d." With regard to the balance, a scheme for the depreciation of automatic meters and stoves during the next few years has been submitted to, and passed by, the Government Auditor, which will appropriate the difference between the income for fittings and the expenditure for new installations. The amount carried to depreciation under this scheme for the past half year is £27,589 8s. 11d. The most satisfactory feature of the revenue account for the half year is the increase of 3¼ per cent. in the gas sales. In the half year to June, 1906, the gain was nearly 4 per cent.; so that as compared with 1905 the increase is upwards of 7 per cent.—a rate of progress which, considering the size of the Company, must be taken as distinctly encouraging. Practically no expenditure of capital on manufacturing plant has been necessary to produce this larger quantity of gas. The increase in gas sales yielded an additional revenue of nearly £40,000. The rental of stoves was greater by £2130 than in the corresponding period of 1906; while there was a large increase in the revenue obtained from coke, amounting to nearly £60,000. The working expenses of the half year may also be regarded as satisfactory. Coal and oil cost the Company nearly £58,000 more than previously; but, apart from the greater quantity of gas made, this was balanced by the better return for coke. It is gratifying to note that, notwithstanding the increased business done by the Company during the period under review, manufacturing wages were less by £20,000, and purification by £12,000. The item of "Repair and maintenance of plant" has gone up by £12,000. This is not a matter for regret; it simply shows that we have persisted in the policy, which has already yielded excellent results, of maintaining works and plant in a high state of efficiency—renewing whatever is obsolete and uneconomical. The expenditure for distribution shows an increase on meter and stove repairs. This, however, is due, as I explained when dealing with the capital account, to special writing off for depreciation. Had it not been for this, the meter repairs would have been £27,400—showing a slight reduction below 1906. The increase in actual stove repairs is due to a large reduction of the stock of stoves waiting repair. They are now dealt with more rapidly as they come in, so saving expenditure on capital account. The item "Gas-fittings" is the one which I have already explained—viz., the fittings in automatic meter consumers' houses. There are two other items in the accounts which call for special note. The first is the reduction of over £7000 in rates and taxes, due to our now feeling the full effect of the reduction in rateable value which was obtained at the last quinquennial re-valuation; and the second is the large amount (£11,700) carried to the insurance fund. This is made up of a special contribution of £2500, and the writing down of Consols, in which this fund is invested, to £85 per cent. Hitherto the Company have not written down this stock, and it has stood in our books at the sum paid for it. The nominal amount will now more nearly represent the realizable value of the investment. There has been handed to me this morning a note from a shareholder, asking me to explain how the reserve fund is invested. The reserve fund, which we have not depreciated, is invested in 3 per cent. India stock. The actual cost was £63,000; and the present market value is under 86—coming to £54,500. The depreciation is therefore about £8000. It appears to us that this stock is not unlikely to improve in value; and therefore it was not necessary to deal with that amount at present. The net result of the half-year's working is that, after providing for the fixed charges and setting aside £10,000 towards the redemption fund, there is a profit of £411,206 6s. 6d. Adding to this the amount brought forward from the previous half year—namely, £229,952 19s. 11d.—the total available for dividend is £641,159 6s. 5d. Out of this sum the Directors recommend a dividend at the rate of £4 8s. per cent. per annum on the ordinary stock; and after paying £150 on account of gas-testing forfeitures, £306,992 6s. 10d. is left to be carried forward to the credit of the current half year.

TECHNICAL INSTRUCTION FOR THE STAFF.

The scheme of scientific and technical instruction for the staff of the Chief Inspector's Department has been actively carried on; and the first examination was held in April in this room. There were 56 Assistant-Inspectors who presented themselves for examination in the first class of candidates; and 99 clerks, foremen, fitters, and others, entering in a second division. The result of the examination was very valuable, both directly and indirectly. It has served as an additional guide to the selection of deserving members of the staff for promotion and distinction; confirming the good repute of some, and bringing forward others whose merits might otherwise have been longer in gaining recognition. During the summer, the staff instruction has been extended in the most practical shape to the mechanics—gas-fitters and their assistants—of the department. There is every reason to believe that this further development is appreciated by, and is benefiting, the men, who in this work are constantly required to deal with the needs of consumers and with new inventions in gas apparatus.

THE COMPANY'S PROSPECTS—THE COAL INDUSTRY.

We are better able to form a judgment now than we were six months ago as to the prospect before the Company in the near future. Our contracts for coal and oil for the year to July next are completed, and involve, as you have been told in the report, an extra expenditure of £250,000 for the same tonnage. This is a heavy tax, and delays for the present our hope of reducing the price of gas. It is, however, matter for congratulation that there will be no necessity to increase the price, and that our income in the coming year will probably meet our expenditure. The condition of the coal industry is remarkable. Not only does the reserve unsold appear to be very small, but there is great difficulty in getting deliveries from some fields over the railways and through the ports. Some of the latter are crowded with ships waiting a turn to load; many of the freights being for foreign parts. The enormous increase in the exported quantity since the removal of the coal duty is doubtless responsible in large part, if not wholly, for the fact that the demand has overtaken the power of supply. No one wishes to see the coal trade injured; but it cannot be for the good of the country that home industries should be crippled, as is now the case, where a profitable remedy is within reach. It is impossible to say how long the high prices will continue. My own opinion, founded on past experience, is that the period will be but short. In the meantime, it is gratifying to know that, however costly the coal-fire may be in the coming winter, those who use gas, whether for light or fire, for stove or for motor, will experience no change.

MEETING THE INCREASED COST OF COAL.

The Directors naturally gave careful consideration to the question how the heavy increase in the cost of coal was to be met. We were already pledged not to raise the price of gas except in face of absolute necessity; while to curtail expenditure on maintenance was directly contrary to our policy. One other plan was available. You will probably have noticed that, following upon negotiations with the London County Council, the Directors have decided to resume the charge for meter-rents, which was discontinued in 1894. It is not necessary to inquire into the reasons which led to the surrender of these rents. There can be no doubt that the change on the part of the Gaslight and Coke Company alone was a blunder. I called attention eighteen months ago to the disadvantage under which the Company were placed before the public when their charge for gas, which included meter-rent, was compared with that of their neighbours, which was supplemented by meter-rents, and expressed my opinion that the inequality should be rectified. This, then, was a suitable opportunity to right a blunder, and to obtain the needed additional revenue. Meter-rents would yield about £60,000; and this would see us through the year of famine price. Not only does the change help us financially and rectify the charge for the purpose of comparison, but it brings under contribution the great number of meters to which I formerly referred as earning no interest because they were retained, most of them, merely as a security against possible failure of electric lighting. Interest upon these meters has hitherto been a charge on the gas, and borne by consumers generally.

THE RE-IMPOSITION OF METER-RENTS.

When we were before Parliament in 1903, the question of meter-rents was considered at the instance of the London County Council; and while declining to surrender our right to make the charge so long as it was retained and exercised by the other Metropolitan and Suburban Gas Companies, we stated that it was not our intention to re-impose them. In view of this expressed intention, the Directors felt bound, in courtesy, to take no action without the concurrence of the London County Council. The proposal we made was, first, that if the rents were recharged the Company would apply no portion of the revenue so derived to the increase of dividend; and, secondly, that there should be no increase in the price of gas for one year. These suggestions, so transparently fair, were accepted by the Council, who recognize that we have not departed from the honourable understanding of 1903. A few members seemed to fear that, as they expressed it, there was something behind our proposals—that they were so favourable to the consumer that we must have some hidden motive in making them. I wish it were possible to convince these gentlemen that we have been perfectly open and ingenuous in our statements that the desire and aim of the Company coincides with its interest, and is to supply gas at as cheap a rate as possible; and that, under the arrangements made with the Council, the whole of the revenue we are to derive will be devoted to that purpose.

SMOKELESS FUEL.

During the last six months, much has been heard about smokeless fuel. Should a demand arise in London for such fuel for household purposes in place of coal, the Company, I am glad to say, are in a position to supply it; in fact, we are already doing so.

FORBEARANCE OF SHAREHOLDERS AND ZEAL OF THE STAFF.

In conclusion, I can without reserve congratulate you and the proprietors generally upon the state and prospects of the undertaking. Thanks partly to your forbearance in not pressing for the full dividend to which, under the sliding-scale, you were entitled, in still greater degree to the able and unstinted service of the chief officers and staff, and, further, to the circumstances which I have detailed, we are able to face what would otherwise have been a time of great trial with a perfectly easy mind. Having regard to the depression and anxiety which just now attend so many industrial undertakings, this is matter for special thankfulness. I beg leave to move—"That this meeting do agree with and confirm the report of the Directors and the Auditors' report and statement of the accounts of the Company, as transmitted to the proprietors on the 25th ult."

The DEPUTY-GOVERNOR (Mr. Howard Charles Ward) seconded the motion, and congratulated the shareholders generally upon receiving what was clearly one of the best accounts that had been presented to them for many years past.

The GOVERNOR invited comments on the part of shareholders, and said he would reply to any questions that might be asked.

REMARKS BY A SHAREHOLDER.

Mr. C. E. JONES said the report and statement of accounts, as well as the Governor's eloquent exposition of them, was a fair commentary upon what had been called a "declining industry." Even now, in some over-sanguine temperaments, there was a disposition to consider the gas interest moribund; or, at all events, every person took up the position that it was a losing one. He could thus congratulate the proprietors very much indeed upon having such a satisfactory report. It showed the elasticity of the business, and the growing popularity of gas, whether used as a fuel or for lighting, or other purposes for which it was so admirably adapted. Gas was still gaining in favour, notwithstanding the competition of many rivals. That was a matter of considerable congratulation. That there was some form of smokeless fuel needed, was evident; and if there was a demand for it, gas companies could easily produce it. By stopping-off the process of destructive distillation earlier than was customary, they might obtain what was practically "Coalite;" and he would suggest that a strong effort should be made to cultivate such a trade. The smoke nuisance was something that was very injurious to health, and was occupying the attention of scientific minds; and everything that went to remove the smoke cloud from the London streets would be a blessing to mankind. With regard to the material advantage which had been derived from the sale of coke, he wished he was sanguine enough to hope that the advantage would be a permanent one. The Governor had very justly condemned some of the conditions of the coal market; but he (Mr. Jones) could not agree with the idea that it would ever return to its former figure. What with Government supervision and the influence of labour over the coal masters, he did not at all anticipate that there would be any reduction in the price of coal for a considerable time to come. There was just one point which was conspicuous by its absence from the report, and that was the Workmen's Compensation Fund; and as there was such an absorbing interest just now centred in the probable operation of the Act, he thought it would be some consolation to the shareholders to know how the Board were dealing with this very serious question. The operations of the Act must be very onerous and expensive, and the statutory obligation now imposed upon gas companies in particular, and industrial interests in general, was perfectly alarming. Where it was going to end, one did not know. His own feeling in the matter was that the measure was hostile to trade and contrary to the genius of commercial people. It was revolutionary, inasmuch as it interfered with the free right of contract; and it was repugnant to home and social life. The Act was inimical to the interests of the working classes, for whose benefit it was supposed to have been promoted. It was sad to think what would happen to those people who were not physically strong, or whose mental condition and hours of labour would remove them from the Act. They could not contract-out of it; and the result would be that there would be a large diminution of employment in the country where there was too much unemployed labour already. He was satisfied that if this piece of legislation remained, it would not do what its promoters thought it would. It would not promote thrift; but it would encourage carelessness, and promote discontent and fraud.

The GOVERNOR: If no one has any further question to ask, I will answer what has been said by Mr. Jones. But before doing so, I may say that a note has just been handed to me asking for an explanation of the different prices charged for gas—viz., 2s. 2d., 2s. 11d., and 3s. The ordinary price charged is 2s. 11d., subject to certain discounts to large consumers and when used for power. The price of 2s. 2d. is charged on the south of the Thames, and follows automatically the price charged by the South Metropolitan Gas Company, with an addition of 2d. because we are under an obligation to supply 16-candle gas, as against 14-candle gas on the other side of the Thames, The South Metropolitan Company now increase their price to 2s. 3d.; and consequently this Company's price on the south side of the Thames will be 2s. 5d. I am not quite sure about the 3s.—the shareholder has probably included the amount charged for repairs, maintenance, lighting and cleaning of the public lamps. That would bring it up to 3s. With regard to Mr. Jones's interesting observations, the Company are, as you are aware, already doing a great deal towards the abolition of the smoke nuisance. I do not claim the merit for the Gaslight and Coke Company alone, but for all gas companies who encourage the use of gas-fires, as you do not have much smoke from chimneys where gas-fires are used. If a demand does arise for smokeless fuel, I repeat, as I said in my opening remarks, that we are in a position to supply it, and are, in fact, already doing so. You will be able to see it burning downstairs if you choose; and we shall probably take means in the winter time to introduce it very largely. With regard to the Workmen's Compensation Act, we do not share quite the dreadful fears of Mr. Jones with reference to its operation. The expenditure under the Act during the last half year has been £1322; and when I remind you, as I did on the last occasion, that we already spend in pensions and allowances to our officers and workpeople more than £48,000 a year, the amount is not a very serious addition to our past expenditure. This, I think, covers all the points that have been raised, and I will now put the resolution.

The resolution was carried unanimously.

THE DIVIDEND.

The GOVERNOR then proposed that the following dividends be declared: On the ordinary stock, £4 8s. per cent. per annum; on the convertible 5 per cent. preference stock, 5 per cent.; on the 4 per cent. consolidated preference stock, 4 per cent.; and on the 3½ per cent. maximum stock, 3½ per cent.—all payable on Sept. 2.

Mr. HOWARD C. WARD seconded the resolution, which was put and carried unanimously.

The GOVERNOR: That will complete the ordinary business of the meeting.

VOTES OF THANKS.

Mr. J. REESON proposed a hearty vote of thanks to the Governor for his lucid and interesting address, and was sure his brother shareholders would join in expressing the opinion that the prosperity of the Company was mainly due to the energy displayed by Mr. Woodall. He also desired to express his appreciation of the able conduct of the other members of the Board.

Mr. W. A. SURRIDGE seconded the resolution, and remarked that the report presented that day was the best testimony of the able services rendered by the Board.

The resolution was passed unanimously.

Mr. A. H. BAILEY proposed a vote of thanks to the officers and staff for the excellent services they had rendered during the past half year. There could but be one opinion about the report, he said, and that was that it was the best which had ever been presented.

The GOVERNOR: On behalf of my colleagues and myself, I thank you for the vote you have just passed. We are proud and thankful that the Company are able to present so excellent a report as we have been able to put before you to-day. I had proposed for myself the pleasure of moving a vote of thanks to the staff. As I am anticipated, I ask to be allowed to second it. I have already said how much we feel we owe to the chief officers and staff, and, I may say generally, to the whole body of men who work for us. There has been nothing but the most cordial, hearty, and able work on their part through now a long period; and it is with the utmost satisfaction that I acknowledge their constant readiness to do anything and everything that is either pointed out to them or that occurs to them to enhance the prosperity of the Company.

The resolution was unanimously carried.

Mr. D. MILNE WATSON (the General Manager): I should just like to express in one word the thanks of myself and of the staff for the high appreciation you have expressed of our efforts. We naturally are very proud of the Company to which we belong, and we are very anxious to see it prosper. We have had our bad times, and now I think we are having our good times. The fight is an uphill one; but perhaps that makes it all the more interesting. Where there is no fight, there cannot be much interest in the work. I can say that the sole anxiety of the officers, one and all—both those here and those at work in different parts of the district—is to put the Company in a sound position; and we shall continue to work as hard in the future as we have done in the past. I thank you most heartily for the kind way you have referred to us to-day.

BRENTFORD GAS COMPANY.

Directorial and Official Changes—Coal Market—The Forged Transfers Act.

The Half-Yearly Meeting of this Company was held on Friday, at the Westminster Palace Hotel—Mr. ULICK J. BURKE in the chair.

The SECRETARY (Mr. William Mann) having read the notice calling the meeting, the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN, in moving their adoption, said he should first like to refer to the alteration in the *personnel* of the Board since the shareholders last met. They had had many changes. In the first place, their late Chairman, Mr. Howard C. Ward, to the great regret of his colleagues, felt himself obliged to retire from the chair, and take matters perhaps a little easier. It was hardly necessary, he thought, for him to go into the career of Mr. Ward as Chairman of the Company. He occupied the position for 36 years; and during those years he never missed a general meeting. He therefore presided over 72 general meetings; and he (the Chairman) thought the proprietors would agree with him that the splendid position to-day of the Brentford Gas Company was largely due to the constant supervision of, and interest taken by, Mr. Ward in its affairs during the time that he had occupied the chair. The capital of the Company per ton of coal carbonized was now not more than £4 13s. 9d.; but it was a great deal more than that at the time Mr. Ward became Chairman. Then the proprietors would all have heard of the death of Mr. Frank Morris, who was also in office (as Director, and formerly as Engineer) for a very considerable time; and they all associated much of the advance of the Company with the intelligent engineering of Mr. Morris. To him they were greatly indebted for the introduction of the inclined-retort system. Inclined retorts had been very much identified with the prosperity of the Brentford Company, and the Brentford Company with the advance in use of that system. They believed that the inclined retort as used at Brentford was the proper system of carbonizing. Mr. Morris was very much missed by his colleagues; and it was an important question as to who was to succeed him. It was a great advantage for them to have expert opinion on the Board; and they felt it very desirable, in filling up Mr. Morris's place, that they should be able to have further expert opinion. Mr. William King, of Liverpool, whose name was no doubt familiar to the proprietors as it was known throughout the gas world, and who was formerly particularly familiar to the Directors in connection with the work he did on the Departmental Committee, had been elected to take the place vacated by

Mr. Morris; and the proprietors might be congratulated on the fact that they had a man of such intelligence and experience to aid in the counsels of the Board. There was yet another loss, because their Engineer (Mr. James Husband) had also left them. He retired after the last meeting. Mr. Husband had not, of course, quite done what Mr. Morris did; but he (the Chairman) thought they must remember that they owed a large debt of gratitude to Mr. Husband. He was with the Company about 24 years, and no doubt he did excellent work for them. He was sorry to say Mr. Husband, though comparatively a young man, was afflicted in his domestic affairs, in a way that was extremely trying to him, and it might be that his work somewhat slackened through this. However, he had gone from them. To fill Mr. Husband's place, they came to the conclusion that Mr. Alexander Johnston, who had a good reputation at Ilford, would be the best man they could possibly get. The Ilford Gas Company parted with him with much regret; and the Brentford Directors—not, however, to their regret—availed themselves of his services. So far as they had seen of Mr. Johnston at present, they had no cause to regret their choice. To follow Mr. Ward in the chair, his colleagues were so flattering as to elect him (Mr. Burke). He could only say that the proprietors should have the best he could give them; but if it was not good, then he hoped they would obtain someone else. Turning to the report, it would be seen they had an increase in the sale of gas of 6·70 per cent. This was very satisfactory. The balance of revenue account amounted to £45,201; and with the balance from last account, £53,305, they had, after deducting interest on debenture stock, the sum of £94,539 for dividend. That, in a nutshell, was the position of the Company. They might congratulate themselves on being in this satisfactory condition. In these days, they did not get 6½ per cent. increase in every Company quite so easily as that. They had sharp competitors. The increase in gas, meter, fittings, and stove rental was £11,377. Though the finances of the Company were in such good case, it was needless to say they had a great many calls, and there faced them a great many unknown calls, upon the balance they had in hand. They could not go on having increases such as this without spending money. The policy of the Company had always been to keep down the capital as much as they possibly could; and if this had not been the policy strongly supported by Mr. Ward, the Company would not be in such a comfortable position as now. They did not want to dip into their capital, except to a certain extent, at present. The state of the coal market was an unknown quantity. One man would tell them the price was going down; another that there was no possible chance of such a thing. He had himself heard from a man interested in the coal market that there was no sign of the price declining. The coal that was going to foreign parts, especially to Germany, was something enormous; and there was not likely to be any immediate drop in the quantity exported. Though in a certain measure, the sending of coal to Germany had been due to the troubles of the Westphalian people, it was not so now that they had got over these troubles. And it therefore became a question whether it was not the commercial prosperity of Germany that was demanding the enormous quantity of coal from this country. Therefore, he did not think they would see any immediate reduction in the price of coal. Developments in the gas world had increased their manufacturing possibilities and necessary capacities. There could not be 6½ per cent. increases without studying the question of manufacturing provision. Therefore they had to look round now, and see how far their machinery was equal to the bigger demands made upon it. The Board felt that the Southall station especially would require a good deal of attention. They would want machinery of all sorts, as well as further dock accommodation. They could at present only accommodate five barges, which was very small. The Board also anticipated that it would be necessary to lay a further main between the Brentford and Southall stations. Of this the proprietors might be satisfied, that the Directors did not wish to spend a penny more than was necessary.

Mr. HOWARD C. WARD seconded the motion. In doing so, he said that he had occupied the chair for 36 years; and while he did not wish to blow his own trumpet, he thought he might fairly claim that the interests of the Company did not suffer during that period. When he became Chairman of the Company, there were a certain number of £50 shares and of £25 shares. These shares to-day were represented respectively by £78 and £39 of consolidated stock, on which a dividend of 12½ per cent. was being paid. The concern was in a thoroughly sound and efficient condition. They had a good insurance fund, a good reserve fund, and a good balance of profit. He (Mr. Ward) had outlived the Directors of the Company three or four times; and he was standing there now nearly 81 years of age. He thought it was really time he left the administration more to younger and more energetic men; and he had the happiness to know that he retired from the chairmanship with thoroughly active and able men around him, full of ability and energy, to carry on the affairs of the Company. In his own career, he always received the greatest kindness and cordial support from the proprietors, and he begged to thank them for it.

Mr. A. B. BOSHER congratulated the Board on the appointment of Mr. King as a Director, and of Mr. Johnston to the engineership. With regard to the question of coal, he met two or three South Yorkshire colliery gentlemen at Sheffield recently, and asked them what was their opinion as to the trend of coal affairs. They said that coal was going to remain very much on the lines of what the price was now—at any rate, so far as they could see, up to next June. After next June, anything might happen—either a great fall or a further small rise. It was impossible to say anything more than that.

Mr. J. REESON also expressed the regret of the proprietors at the retirement of Mr. Ward from the chair.

The motion was unanimously carried.

A dividend was declared at the rate of 5 per cent. per annum on the 5 per cent. preference stock, 12½ per cent. per annum on the consolidated stock, and 9½ per cent. per annum on the new stock, 1881.

The CHAIRMAN next moved that the provisions of the Forged Transfers Acts, 1891 and 1892, should be put into operation in connection with the Company.

Mr. R. J. NEVILLE-NEVILLE, in seconding the motion, said this was a matter that was not perhaps very important, because in their Company they were dealing with honest men. But there had been cases in which some companies had been largely and badly hit by the fact that they had had to make good certain stock which had been transferred on a forged transfer. The Directors thought they ought to avail themselves of the advantages given by the Act to enable them to insure themselves against having to pay a large sum in case of a forged transfer. If there was a big transaction, it might be such as to interfere with the dividend; and therefore the Board thought they ought to take advantage of the protection the Act gave them.

A vote of thanks to the Chairman and Directors and officers concluded the proceedings.

SOUTH SUBURBAN GAS COMPANY.

Half-Yearly Report and Accounts.

The following is the report of the Directors for the six months ending the 30th of June, which, with the accounts, will be presented at the half-yearly general meeting on Friday.

Fortunately the coal contracted for in 1906 was sufficient to supply the Company's need during about five-sixths of the half year under review, while throughout the half year a higher price has been obtained for coke than in the corresponding period; and there has been an increase of 3·4 per cent. in the consumption of gas. The profit earned is consequently sufficient to pay a dividend, which the Directors recommend, at the rate of 5½ per cent. (the same as last year); to make an addition to the insurance fund, bringing it up to £20,000; and to slightly increase the amount carried forward.

The Directors with great regret have to inform the shareholders that the serious rise in the price of coal on the contracts made in April has compelled them to increase the price of gas from Midsummer to 2s. 7d. per 1000 cubic feet, as explained in the circular issued to the consumers. The effect of this increase of price under the sliding-scale will be to reduce the dividend payable by 6s. 8d. per cent., or £2016 a year. But as the dividend paid since the last reduction of price has been 3s. 4d. per cent., or £1008 a year, below that to which the shareholders were entitled, the actual reduction of dividend will be 3s. 4d. per cent.; and so long as the price is maintained at 2s. 7d., the dividend payable will be at the rate of £5 6s. 8d. per cent. instead of 5½ per cent. hitherto paid.

Another effect of the increase of price is to reduce the co-partnership bonus of the employees. This bonus increases as the price of gas falls, and decreases when it rises. For the past twelve months they have received a bonus of 6½ per cent. on their salaries and wages, or a total of £3075. The sliding-scale principle has been extended to the employees—thus making a triple partnership of consumers, shareholders, and employees, uniting all three interests; it being thus to the advantage of shareholders and employees alike that gas shall be sold at as low a price as possible. The effect of the increase in the price of gas is to reduce the employees' bonus from 6½ to 5 per cent., or about £700 a year. It has often been said that so long as the bonus is maintained or increasing the employees will be content, but that a reduction of bonus or a sharing of losses would cause the failure of the system. The price of gas was increased, and the bonus, as well as the dividend, seriously reduced, in 1901; and the employees equally with the shareholders understood the position, and accepted it without a murmur. As soon as possible, the Directors will again reduce the price and increase the dividend to the shareholders and the bonus to the employees.

In other respects the affairs of the Company have been prosperous and uneventful. The works and plant are in thoroughly good order, and capable of efficiently meeting any demands that may be made upon them.

In 1904 the shareholders adopted a scheme for the election by the shareholding workmen of two of their number on the Board. In 1905 a bricklayer and a carpenter were elected as Directors; and your Directors have the great pleasure to state that men more suitable in every way could not have been found. The scheme authorizing the election of Employee Directors expires this year; and if the system is to be continued, a new scheme must be adopted at this meeting. Your Directors, fortified by experience, unhesitatingly recommend its renewal in a permanent form for the election of three Employee Directors—one salaried official and two workmen—with a provision for its termination if the co-partnership system should not continue to answer its purpose of promoting a true union between employers and employed. A copy of the proposed new scheme will be sent to any proprietor on application to the Secretary. A resolution for its adoption will be submitted to a special general meeting to follow the ordinary meeting on the 9th of August.

The accounts accompanying the report show that £2503 was spent for capital purposes in the first half of the year; £899 being for new and additional meters and stoves. The total capital expenditure on the 30th of June amounted to £805,180, or £26,183 more than the receipts, including the premium capital. The net revenue from the sale of gas was £83,770; the rental of meters and stoves produced £6040; the sale of residuals, £30,349; and a small item of rents brought up the total receipts to £120,215. The following were the principal items of expenditure: Manufacture of gas (including £49,601 for coals and £15,380 for maintenance of works and plant), £72,370; distribution, £10,363; management, £4444—rents, rates, and taxes (£4507) and miscellaneous items bringing up the total to £94,143. Among these items is a sum of £1325 paid to employees under the co-partnership scheme; making, with £1750 paid on account in the December half of last year, a total of £3075 in the twelve months. The balance carried to the net revenue account is £26,071; and the amount applicable for dividend is £20,029. The statements relating to the working show that 65,207 tons of coal were carbonized in the half year. The quantity of gas made was 725,067,000 cubic feet, of which 695,058,000 cubic feet were sold and 704,040,000 cubic feet accounted for. The residuals produced were: Coke, 782,484 cwt., of which 171,063 cwt. (estimated) was used in manufacture; breeze, 18,031 yards (9284 yards used); tar, 666,811 gallons; and ammoniacal liquor, 15,198 butts—the make of sulphate of ammonia being 668 tons.

CO-PARTNERS AT THE CRYSTAL PALACE.

True Socialism.

Socialists with strong and right ideals were in evidence at the Crystal Palace last Thursday; and over them that arch-Socialist (Sir George Livesey) presided. But these particular Socialists have a brand of principles of their own. They claim a share in the industrial wealth of the country; but they covet no man's property, much less do they say that any man should deliver up his rightful possessions in order to enrich them. They believe that every man should do something to earn and to show that he deserves, and is capable of holding, property. There is dignity about their creed; something removed from the sordid, commonplace, and dishonourable notions of the ultra-Socialists, whose voice is now so frequently heard over the land. The Socialists who were at the Palace are a long way on the high road along which property is accumulated, and have been busy there for eighteen years, while the other types of Socialists are still clamouring, and are still empty-handed. These accumulators of property are the representatives of the army of Co-partners of the South Metropolitan and the South Suburban Gas Companies. They own hundreds of thousands of capital in the Companies; yearly they add to their holdings; and by the capital they are creating, they are creating labour for others. By no stretch of imagination can a system be conceived to which the title "True Socialism" could be so correctly applied as this one.

The Co-partners and their wives sat down to dinner at one o'clock; and Sir George took the head at one of the central tables. He had with him the Deputy-Chairman of the South Metropolitan Company (Mr. Simpson Rostron) and Canon Ransford, one of his old personal friends. At the head of another table was Mr. Charles Hunt, who is a Director of the South Suburban Gas Company. Mr. Charles Carpenter, Mr. Frank Bush, Mr. S. Y. Shoubridge (South Suburban), Mr. Charles M. Ohren (South Suburban), Mr. A. F. Browne, Mr. J. Tysoe, and Mr. H. C. Sims (Secretary of the South Metropolitan Co-partnership Committee), and possibly other officials of the two Companies were also present. The Co-partnership Committee itself was, we believe, fully represented. All of the South Metropolitan Workmen-Directors were there—Mr. Henry Austen, Mr. J. A. Butcher, and Mr. C. T. Drumgold; and so were the two Workmen-Directors of the South Suburban Gas Company Mr. W. G. Waller, and Mr. R. Wyllie. Right glad were one and all to see that Mr. Bush was sufficiently well to be present, though one and all equally regretted that he was not strong enough to address them.

As customary, after dinner there were several speeches, beginning with an address by the Chairman. On behalf of the Directors of the two Companies, he bid those present a hearty welcome. He then referred to the time when conditions had the effect of knitting closer relationships between master and men. Those days, he said, seemed to have altogether passed; but he believed that now they had found something which united them, so far as the South Metropolitan and the South Suburban Gas Companies were concerned, in a truer, warmer, and stronger bond than even that which existed in the old times—that was, the bond of Co-partnership. Nowadays, there was much talk of inequality in the distribution of wealth. In their humble way, under the Co-partnership system, they were trying to bring about that better distribution of wealth. He did not at all believe in the proposition that the best way of doing this was to take from the rich and give to the poor. There seemed to him to be a certain want of morality about that plan. Great multitudes of the rich were the poor men of yesterday. Their fathers or their grandfathers were working men; and they became rich by industry, by intelligence, by honesty, and by hard work. If the money they had earned and saved had been taken from them, and given to those who had not earned and saved anything, what would have been the condition of the country now? Take their own Companies for illustration. Several millions of pounds had been spent on building and establishing the works of the South Metropolitan Gas Company, and about three-quarters of a million on those of the South Suburban Gas Company. That money had come from the industrious and thrifty. It had been the means of starting and carrying on the businesses, and had given employment to something like 6000 men in the two Companies. If this money had not been saved, and had not been put into the two businesses, these 6000 men would not have had the work provided for them. In their efforts in the better distribution of wealth, he was pleased and proud that the Directors had met with such hearty co-operation from all ranks of the employees of the two Companies. Those present only constituted a small part of the workmen of the two Companies; but the workmen who were there representing the South Metropolitan Company alone held stock amounting to well over £20,000. That amount of stock was the possession of something like 170 working men—only that of the officers present not being included; and if the holdings of the men present from the South Suburban Company were included, it would probably be found that there was some £25,000 in hard cash represented by the workmen assembled there. The average for each South Metropolitan worker then in the room was about £112. This did something for the men. They had had the responsibility of saving it, and of taking care of it. If £100 was given in a lump sum to a poor man, he would hardly know what to do with it. If he saved the money, he would, by the self-denial, thought, and consideration that he had given to the matter, have got an education in the responsibility of managing property. What the Directors were also looking forward to was that their people might be able to regard the future without anxiety. Sir George here referred to a letter he had received from Sir Fortescue Flannery, one of the Directors of the South Suburban Company, which contained much food for reflection. Among the sapient remarks in the letter was this: "It is not in any way touching on politics to say that the recent elections have shown the spread of Socialistic doctrines, and, therefore, the aspirations of men and women for better conditions of life." Sir Fortescue meant that what was really at the bottom of a good deal of the Socialism was anxiety to get better conditions of life without waiting for those who called themselves Socialists to do something impossible and utterly unreasonable. In their two Companies, they were trying to do this in their own way, and were succeeding. Sir Fortescue also said: "These better conditions of life can only be obtained by personal effort and self-denial. . . . These [the personal effort and the self-denial] are trainings in character; and the advancement in character of the individual is perhaps not the least valuable result of the Co-partnership system. I cannot understand why the system progresses so slowly throughout the country. But at all events it is a success with us." What, added Sir George, the Directors were anxious about was that the Co-partnership system should lift to a higher plane of responsibility, and other things also. President Roosevelt said the other day that what he wanted to see was "a righteous peace in the industrial world." He (the Chairman) thought they could claim that the Co-partnership system had secured "a righteous peace" in this little industrial world of theirs.

Following, came a very happy speech from Canon Ransford, an old friend of Sir George's. He referred to his wife and himself as co-partners, and said their richest wealth was their children. The first four words in the Bible were: "In the beginning, God." Their children were their richest treasure; and he entreated those present to let their children understand that, in the beginning of their lives, in the beginning of their education, in the beginning of their career, in the beginning of every day and every week, God should stand. "In the beginning, God." With Him they were co-partners in the great work of the world.

Testimony to the immense good the Co-partnership system had effected in the two Companies was borne by Mr. Charles Hunt. He said it promoted the best of feeling between employers and employed, without which no industrial enterprise could hope for a full measure of success. He was sure, seeing as he had done the gradual growth of savings among the employees of the South Suburban Gas Company, that many of them would have reason at some time to bless the day that this system was inaugurated. It was a source of great satisfaction that the system was growing in stability and solidarity as time went on, though naturally they could not expect that the bonus would increase year by year. Unfortunately, they had now to look forward to a possible reduction of bonus; but he thought that was only to be regarded as a passing cloud and render the future sunshine all the more acceptable.

Two representatives of the South Metropolitan men spoke—Mr. Beard, of the Bankside station, proposing a cordial vote of thanks to the Chairman and Directors, the Engineers, and Secretary, and all officially associated with the scheme; and Mr. Wenbourne, of East Greenwich, seconding it. Of Co-partnership as the best means of bringing capital and labour together, neither could possibly have declared their views in higher terms. On behalf of the South Suburban Company, Mr. W. G. Waller (of the Workmen-Directors) spoke. He expressed his appreciation of the Co-partnership system, and described it as the only practical solution of the labour problem. They were all well aware that the eyes of the industrial world were fixed upon these two Companies, to see if the Co-partnership system and the Workmen-Directors were a success. He was sure they all wished the system should be a success, not only for themselves, but for the benefit of the working classes throughout the world.

The vote of thanks was very heartily passed.

The pleasure of returning thanks for the vote, on behalf of the Chairman and Directors of the two Companies, fell to Mr. Simpson Rostron, the Deputy-Chairman of the South Metropolitan Company. He said the heart and soul of this movement was their Chairman, with whom he had been associated now for nearly thirty years, and whose efforts in this direction he (Mr. Rostron) had done his best to support and second. He had done so because he believed it was an excellent movement, and brought the workmen and the Directors together on terms of good feeling and social intercourse.

Before calling upon Mr. Carpenter, the Chairman referred to the serious illness through which Mr. Bush had passed, and said they were very grateful that he was able to be with them that day. But it would not be wise for Mr. Bush to speak, as he was not strong yet; and they must not run any risks with him. In Mr. Bush they had a true friend. He had been his (Sir George's) trusted friend in connection with the South Metropolitan Company for a good many years; and he was a friend to all the officers and employees.

With a word of regret that he was not to have the pleasure of following his colleague Mr. Bush, Mr. Carpenter stated that, from the point of view of steadfast belief in the value and great good which the Co-partnership system had been to the South Metropolitan Company, he yielded to no one. One statement that had been made might be open to a little misapprehension. It was said that the workmen present in the room, with their wives, had £25,000 of savings in the two Companies. This statement alone would not be of any great interest to him, nor did he think that any very great value could be attached to it. It would simply imply that the amount of money had been saved, and had been put by for safe keeping in the coffers of the Companies. But there was a matter of much greater importance—that the £25,000 referred to was held by the workmen present in shares in the Companies as part of the capital; and he thought that was a very different thing indeed to having £25,000 of savings in the Companies. It had also been mentioned that, owing to several matters, chief of which was the rise in the price of coal, the bonus for the ensuing twelve months could not be at the same rate as that which they had all taken for the past year. It behoved them to do the best they could, in order, as far as possible, to counteract the pernicious influence of the rise in the price of coal.

As the chief officer of the South Suburban Gas Company, Mr. S. Y. Shoubridge expressed gratitude for the advantages that all the Co-partners enjoyed. Among his remarks, he said that Sir George had frequently told them that, if the Co-partnership system was to continue, it must be beneficial to the three orders of Co-partners—the shareholders, the consumers, and the employees. He was glad to say that this half year they, of the South Suburban Company, were able to verify Sir George's predictions in all respects; for not only had they received the largest bonus they had ever had—6½ per cent., or nearly £3100, but they had made the largest profit that had ever been made in the history of the Company, while the price of gas had been the lowest on record. This, he thought, amply proved what Sir George had predicted would be the result of true Co-partnership, that all the

three orders of co-partners would benefit. It was a matter of profound satisfaction that they had been able to produce this result.

Prefacing a speech from Mr. Austin, one of the Workmen-Directors of the South Metropolitan Company, the Chairman bore testimony to the fact that the Workmen-Directors of both Companies had acted justly, fairly, and straightforwardly towards the interests of all classes—consumers, shareholders, and workmen alike, and not in any narrow-minded class spirit. He added that the employees now had a share not only in the profits, but also a share in the responsibility of management; and better Directors could not be found, if one searched England through, than the four workmen and one official the employees had selected from among themselves.

In a spirited speech, Mr. Austin gave some interesting statistics, showing the remarkable progress of the Co-partnership system. He said that during the past eighteen years, the Co-partners had received, with this year's bonus, £390,000. This year the bonus would amount to £45,000; and if the men of the South Metropolitan Company did as well this year as last, they would have put £88,000 into stock in two years. Last year they had £43,000, and £42,000 was put into stock. This year £45,000 was being distributed; and he hoped every penny of it would go into stock. Then he came to the savings, and £132,000 had been saved during the past seventeen years. The interest upon their savings had amounted to £23,544; and, by way of dividend upon their stock, they had £55,000. Could anyone have predicted eighteen years ago that there would have been stock passing through the Co-partnership pass-books amounting to £601,547—over half-a-million of money had passed through the Co-partnership system.

The gratifying announcement was made by Mr. H. C. Sims, the Secretary to the Co-partnership Committee of the South Metropolitan Company, that the whole of the withdrawable bonus allotted for last year remained untouched.

With a few concluding words from the Chairman, the happy party separated, to enjoy the delights of the Palace and grounds until they reassembled for tea. Afterwards most of them remained to see the famous firework display. The day was exceptionally fine; and all the employees proved themselves as efficient Co-partners in pleasure, as they are in honest daily work and in its fruits.

PRICE OF GAS IN BOSTON (MASS.).

The Working of the Sliding-Scale and Profit-Sharing.

Readers may remember that some time ago the Boston Consolidated Gas Company adopted the sliding-scale system, which has been found to work to the advantage of both the Company and the consumers. During the past two years, four reductions, each of 5c. per 1000 cubic feet, have been made in the price of gas; the last one, which came into operation on the 1st ult., bringing the charge down to 80c. This will mean a saving of about $800 000, compared with the price charged before the local Companies were consolidated two years ago, as noticed in the "JOURNAL" at the time. The Company have some customers who use, on an average, less than 50c. worth of gas per month, and who, therefore, are a source of loss. Consequently, to partially meet this, these consumers will be charged a sufficient sum for the use of the meter installed on their premises to make the total charge for gas and for the use of the meter not less than 50c. By this reduction, the Company, under the sliding-scale, may increase their dividend to 9 per cent. per annum on their 151,106 shares as from July, 1908. For the financial year ending June last year, the Company paid 7 per cent. on their stock; and for the current year 8 per cent. will be paid by virtue of the reduction made in the price a year ago. The Act provides that with every full year's 5c. reduction in price, the Company may increase their dividend rate by 1 per cent. the subsequent year, should the earnings allow of it.

Mr. Louis D. Brandeis, a member of the Public Franchise League—an organization the object of which is the guarding of the public interests in connection with gas legislation—has lately referred with much gratification to the action of the Company. In the course of his remarks he said: "The reduction in the price of gas just announced by the Boston Consolidated Gas Company, from 85 c. to 80 c. per 1000 cubic feet, is an event of more than local or passing significance. The reduction follows quickly after three other reductions in price within a period of two years—the first on July 1, 1905, from $1 to 95 c.; the second on Jan. 1, 1906, to 90 c.; and the third on July 1, 1906, to 85 c. To have made a reduction in price of 20 per cent. during so short a period, in which prices for labour and materials have risen so largely, is certainly a remarkable achievement. It will mean a saving to the people of Boston next year of $800,000 over what gas would have cost them at the old price of $1 if the estimated consumption of 4 billion cubic feet is reached. Fortunately the results to the stockholders of the Company have also been eminently satisfactory; and they may hope soon, under the law, to reap their just share of this remarkable achievement. . . . Gas properties which for the greater part of twenty years had been the subject of financial and political scandal and corruption, exciting the bitterest hostility on the part of the people, have been conducted in a manner so honourable as to deserve and to secure the highest commendation on all hands. The officers and employees of the Company, instead of engaging in lobbying and other political activities, have devoted themselves strictly to the business of making and distributing gas, and with such ability and good effect as to attain in an almost incredibly short time for the people cheap gas, and for the investors security and the prospect of large returns. These remarkable gains are the direct result of the wise, progressive, and efficient management of President Richards and his associates, operating under the wise and progressive legislation promoted by the Public Franchise League. It was well worth the three years' strenuous efforts of the League to have secured the low capitalization and the sliding-scale law under which the Consolidated Company has in a true sense become a partner of the community. The interests of the gas consumer and of the stockholder have become identical; and President Richards and his Directors have, with great wisdom, extended this partnership also to the employees. Their system of profit-sharing must have been potent in securing loyal and efficient work without which such results could not have been attained. President Richards has, by establishing the practical success of the sliding-scale law—the passing of which he and the Public Franchise League co-operated to secure—furnished to the whole country an alternative for municipal ownership. The Boston example is sure to be followed soon elsewhere. If we could have more wise legislation like this, and our public service corporations were managed by men of the ability, enterprise, and public spirit of President Richards, the cry for municipal ownership would soon subside. He has shown that a man may become recognized as a most useful public servant while engaged in the business of making money for his stockholders, and that the surest way to make money in public franchise corporations is to co-operate with, instead of antagonizing, the people."

Referring to the reduction, the "Boston Transcript" said: "The success of the sliding-scale plan for regulating the price, by which investors and consumers share the benefits of all economies of operation, is full of suggestiveness for other public service enterprises. Under the old system, managers of such a corporation as this were half-afraid to avail themselves of any unexpected economy, especially if it threatened to be temporary, lest the State Commission having its business in charge, or the Legislature, should seize on such results as an excuse for ordering a substantial reduction in price to the consumer, when perhaps business conditions might soon change so that this rate would be oppressive. This sort of State supervision did not develop the best talent and resourcefulness of the managers of a public service corporation. The sliding-scale scheme has done just that. . . . In this period of advancing prices on every side, it is exceedingly gratifying to have one commodity of every day use move in the other direction. In announcing this reduction, the Company take into account the expected increase in consumption of the succeeding year, not only from the growth of population, but from the added inducement which this lower rate gives to the use of gas for cooking and other domestic purposes. No wonder the advocates of the public ownership of gas supply opposed the sliding-scale. It is showing how the best results for the public can be obtained through stimulating the best energies of the private owners of the huge Consolidated Corporation Gas at 75 c. will probably be possible in a few years."

PUBLIC LIGHTING IN ISLINGTON.

Gas Preferred to Electricity.

At a meeting of the Islington Borough Council last Tuesday, the Special Committee appointed last December to inquire and report on the position, financial and otherwise, of the electric light undertaking, including the scheme for the extension of street arc lighting adopted by the late Council on March 2, 1906, presented an interim report dealing with the scheme referred to. It was to light 15 miles of streets (then lit by gas) by electricity, and to displace 714 incandescent gas-lamps, at an estimated total cost of £21,011. After the most careful inquiry, the Committee had arrived at the following total annual cost of the scheme: Interest and redemption charges in respect of installation, £1311; cost of current, £1660; cost of carbons and maintenance, £1520—total, £4491. The annual cost of the 714 gas-lamps (proposed to be displaced), for gas and maintenance, was £2376 per annum. The contracts entered into by the authority of the late Council amounted to £14,574; and of this total the value of the material actually received up to May 11 was £7443—leaving material of the value of £7131 yet to be delivered. Altogether, the amount to which the Council were not yet committed was £5328. The Electrical Engineer (Mr. Albert Gay) reported that the maximum load on the plant in 1906-7 was 3000 kilowatts; that increased output resulting from the adoption of the scheme would bring the maximum load to 3250 kilowatts; and that the total capacity of the station when the turbine was running was 5100 kilowatts. He further stated that the reserve should equal the capacity of the largest unit of plant—viz., 1500 kilowatts. This, if the scheme were carried out, would leave a working margin of 350 kilowatts. It was therefore obvious that the additional production contemplated by the scheme would render more urgent the laying down of further plant in the near future; and it was estimated by the Electrical Engineer that, apart from the scheme, an expenditure of from £12,000 to £15,000 for generating plant would probably have to be incurred during the year 1908-9. A portion of the scheme had already been carried out; and its total yearly cost would be £1348. Against this, was to be placed a sum of £809 which used to be paid to the Gas Company—leaving a net yearly charge on the rates of £539.

After an exhaustive examination of the scheme, the Committee arrived at the following conclusions: (1) That the scheme was ill-conceived, and, if carried out, would be detrimental to the interests of the borough; for while it was admitted that the general rate would benefit to the extent of £505 per annum by the displacement of the gas lighting, this could only be effected at a cost of £2620 per annum to the undertaking. The Committee were informed that the profits of the undertaking for the past year amounted to £1530; so it would be seen that with the scheme in operation there would be a deficit, for which the general rate would be responsible. (2) That the streets affected by the scheme were already well lit by incandescent gas, and no case had been made out for the use of a more expensive illuminant. (3) That the probable demand for current by private consumers in the thoroughfares in question was so small that the large outlay represented by the apportionment for private lighting was not justified. (4) That the adoption of the scheme would prevent the possibility in the future of any appreciable reduction in the lighting rate, which it was admitted had been excessive. The Committee were therefore of opinion that the scheme should not be further proceeded with. In the event of the Council agreeing to this, the question of the disposal of the stock remaining in hand and yet to be delivered had to be considered. The total value of the material thus to be dealt with was £10,254; and of this sum cable represented £8104. The Electrical

Engineer informed the Committee that he could take into stock for immediate or for almost immediate use cable to the value of £3214; and the bulk of the remainder of the cable could be employed apart from the scheme in the course of the next two or three years. Altogether, including the interest chargeable on the material retained in stock, the net immediate loss arising from the abandonment of the scheme was put down as £331. The Committee made recommendations in accordance with their conclusions.

In moving the adoption of the report and recommendations, Mr. Cowling said the £21,000 was only the beginning of a huge scheme for lighting the whole of the borough at a cost of £250,000. The lighting had increased by leaps and bounds. In 1895 it was done at a cost of £14,430 for gas; in 1907 it cost £34,814, exclusive of interest and repayment of loans, which were equal to a 2d. rate. He did not say that the borough was properly lighted in 1895; but he would point out that while 101 miles were well lit by the incandescent system at a cost of £16,142—*i.e.*, for about £160 per mile—electric light cost £810 per mile. There was a subsidy for electricity from the general rate, which a private undertaking could not have, and which would convert the so-called profit of £1800 into a loss. It had been stated that the Committee's recommendations were submitted for the purpose of wrecking the undertaking; but he denied this. At the same time, the Committee realized that the undertaking was trembling in the balance. It was contended by several speakers that the figures in the report were not to be relied upon, and that it would be a waste of public money if the Council were to abandon the scheme, after having spent so much money upon it.

Several amendments were defeated; and, in the result, the Committee's report and recommendations were carried by 37 votes to 13.

PUBLIC LIGHTING AT TOTTENHAM.

Improvement Sanctioned.

As already reported in the "JOURNAL," the Tottenham Urban District Council on the 18th of June received from their Engineer (Mr. W. H. Prescott) a report upon the public lighting, and it was resolved to send a copy of it to the Tottenham and Edmonton Gas Company for their observations. At the meeting of the Council last Thursday, a letter was received from Mr. A. E. Broadberry, the Company's Engineer and Manager, in the course of which he said there was nothing in the report to criticize adversely, and it contained much interesting detail. Comparisons were made with Wood Green, Edmonton, Leyton, Hornsey, and Walthamstow; he believed it was with Hornsey only that comparison was intended. Mr. Broadberry then proceeded as follows: "The fundamental difference is that in Hornsey the Corporation do the lighting themselves, simply paying for the gas to the Gaslight and Coke Company 27s. 9d., and to the Hornsey Gas Company 27s. 4d. per lamp. This works out at 2s. 2d. per 1000 cubic feet for the Gaslight and Coke Company, and 2s. 1½d. for the Hornsey Company. I understand the former Company's price is to be raised to 2s. 5d. After deducting our lighting and cleaning costs, we have 1s. 11·32d. per 1000 cubic feet for our gas. I believe the Council desire, as far as possible, to work with direct labour; and if means can be found for satisfactorily transferring the work, and guarding against waste of gas, we can have no objection, so long as we receive 2s. 5d. per 1000 feet for the gas. The only difficulty would be overcome if the Council would take over the Rostin lighters, of which there are about 800, at the cost price of 50s. each, or continue to pay the present rates for them and take over the remainder of the lamps. The next comment must be in regard to the hours of lighting and extinguishing. The lighting agreement calls for all lamps to be alight half-an-hour after sunset. This means starting to light three-quarters of an hour before the sun goes down. The agreement also calls for all lamps to continue to burn until half-an-hour before sunrise. This means that some must still be burning until the lamplighter finishes his round three-quarters of an hour after the sun is up; but they do not do this at Hornsey. Cutting down from 4144 (which is the ascertained number of hours we have found necessary to fulfil the agreement requirements) can be done by extending the Rostin system. During the last year the average number of hours by that system was 3744, or exactly 400 hours less than by hand work. No reduction has been made to the Council on account of this, because it is partly our repayment for the expense of installing the Rostin lighters; but if the Council will take over the apparatus, we can at once make the reduction. Another point in regard to the cutting down of the hours is that the cost of wages for painting, lighting, extinguishing, cleaning, supplying mantles, glasses, and repairs to lanterns remains the same; and economizing on one item at the cost of general efficiency appears to me bad economy. With regard to the 'C' burners, for general all-round work it is difficult to beat them; and as they were applied in the old existing lanterns, many of them thirty to forty years old, it, in combination with the bulb set, was the only possible application of incandescent lighting. No one, however, would advocate them in preference to some of the modern burners and up-to-date lanterns for brilliancy and efficiency. But the Council still continue to order the old type of lantern; and the 'C' burner and the bulbs are the only suitable accompaniment. The lanterns the Tottenham Council order are the plain 14-inch ordinary lamps costing 8s. 6d. each; whereas those at Hornsey, made by the Council's own men at less than ordinary selling price, cost 23s. 6d. I believe the reason for continuing with the old pattern is that in the new streets the estate owners have to supply the lamps; and a difficulty has been felt in compelling them to put into back streets better lamps than have existed in the older main and secondary roads. The best recommendation in regard to this which I can make is that, on condition that the Council will make an extensive sweep of the old 14-inch lanterns, we supply them with 17-inch Lucas 200-candle power self-intensifying lamps at something under cost price. The consumption of gas will be 6 cubic feet per hour, against the present 3½ cubic feet; but the cost of the mantles, labour, and other items being the same, a far brighter light will be secured at a slightly increased cost. This would make Tottenham one of the brightest spots in London; and I believe that is what its Council wants it to be."

The Council's Engineer stated that he had considered the foregoing communication. If the system in operation at Hornsey was adopted for Tottenham, the Gas Company would, as stated, increase the charge for gas from 1s. 11·32d. to 2s. 5d. per 1000 cubic feet, which would mean an increase in the cost of gas of 8s. 1d. per lamp per annum. With regard to the Rostin automatic system of lighting and extinguishing the public lamps, adopting the figures supplied by the Company, it caused a saving of 400 hours' lighting for each lamp per annum; and as 800 lamps were fitted with it, the saving of gas was equal to £108 17s. 8d. per annum. In addition, as the cost of the upkeep and maintenance of each of the lamps referred to was 6s. less than under the old system, a further saving of £240 was effected by the Company. Thus for the expenditure of £2000 (the cost of installing the Rostin system on the 800 lamps), the Company made a total saving of £348 17s. 8d., and the Council did not receive any benefit therefrom. As to the suggestion that the Council should make an extensive sweep of the existing lanterns in the district, this would involve an expenditure of about £3500 to provide the 17-inch Lucas 200-candle power self-intensifying lamps; and, in addition, the extra 2½ cubic feet of gas per hour consumed by these lamps would increase the Council's gas bill for public lighting by £1800 per annum.

The General Purposes Committee had considered the Company's reply and also their tender for the public lighting and the maintenance of the lamps, and were of opinion that no pecuniary advantage would accrue to the district by the adoption of the system in operation at Hornsey; and they recommended the Council not to entertain the proposal. As to the Company's tender, having regard to the current price of coal, the Committee recommended that the terms quoted by the Company in their letter of the 18th of June be accepted; and that they be requested to adopt some other system for the renewal of mantles, so as to ensure an improvement of the lighting of the district. With regard to the proposal to adopt 17-inch Lucas lamps throughout the district, the Engineer suggested that the public thoroughfares of the district should be divided for lighting purposes into three classes: (1) The main roads and a portion of West Green Road to be lighted with electricity. (2) Contributory or secondary roads to be lighted with 17-inch Lucas 200-candle power self-intensifying lamps in lieu of the existing "C" burners, entailing an initial expenditure of £250 for new lanterns and burners, and increasing the total cost per annum by £75. (3) Side roads to be lighted as at present, and the lanterns proposed to be removed from the contributory roads to be reused in new streets. The Committee recommended the Council to adopt the Engineer's suggestions.

To the motion for the adoption of the report and recommendations, an amendment was moved to the effect that the consideration of the matter be adjourned until the Council's Engineer presented a scheme on the question of direct labour. After some discussion, however, it was negatived, and the motion was carried.

Automatic Controller Test for Liverpool.

At the last meeting of the Liverpool City Council, there was some discussion on the subject of the lighting and extinguishing of the public lamps. Sir Charles Petrie called attention to a report drawn up by the Lighting Superintendent (Mr. A. G. Smith) on a proposed scheme to equip a number of the street-lamps with automatic lighting and extinguishing apparatus, and said it was contended that a saving would be effected by the application of this principle. According to the estimate, there would be 18,513 controllers and 13,900 new lamps, and a capital expenditure of something like £37,458 would be required. Taking credit for 13,900 old lamps at 7s. each, the expenditure would be brought down to £32,593. The subject had come before the last meeting of the Lighting Committee; and it occurred to him that it was a very large sum of money to expend without having made any experiment whatever. Two members of the Committee, together with Mr. Smith, visited certain towns—Folkestone in particular—to observe the system of automatic controllers at work; and they also went to Bristol, where the clockwork arrangement necessary for the contrivance was manufactured. The Lighting Engineer had patented a particular lamp, which it was claimed could be effectively worked on this system; and it was estimated that the saving in labour and gas by the adoption of the system would be £10,537 a year. He was sorry they did not distinguish between the two headings of economy, as he would have liked to know how much would be saved in labour and how much in gas. Other economies, it was claimed, would bring the total saving up to £13,653. He had opposed the recommendation because he felt they had not had sufficient experience of the system. He proposed an amendment that they should try as an experiment 250 of the appliances, which, he suggested, should be subjected to a severe test at the Pierhead, in Lime Street, or at other exposed places. One of the subsequent speakers remarked that the sanctioning of the scheme would make them less able to adopt more generally the electric light. They would be putting themselves in the hands of the Gas Company for an interminable period. The amendment was carried by a large majority.

Thefts from Prepayment Gas-Meters.—At the County of London Sessions last Tuesday, Abraham Myman, a tailor, and Philip Zukerberg, a presser, were indicted for stealing 1s. 2d., the property of the Commercial Gas Company. Myman pleaded "Guilty." Mr. Huntly Jenkins, who appeared for the prosecution, said the money was taken from an automatic gas-meter, the property of the Company, in an unoccupied house in Sanders Street, Stepney, on the 14th of July. The Jury found Zukerberg guilty. Mr. Jenkins mentioned that within the last six months there had been 1700 robberies from prepayment gas-meters belonging to the Company. Prisoners were each sentenced to three months' imprisonment with hard labour, and to be recommended for deportation at the expiration of their sentences.

GLASGOW CORPORATION GAS SUPPLY.

Annual Report of the Gas Committee—Accounts for the Year.

The Thirty-Eighth Annual Report by the Committee on Gas Supply, which embraces the year from June 1, 1906, to May 31, 1907, was submitted to the Town Council on Thursday last, and is in the following terms.

I.—FINANCE.

The gross revenue amounts to		£865,470
and the gross expenditure to	£662,554	
to which is added depreciation written off capital assets	54,668	
		717,222
The balance carried to profit and loss account being		£148,248
The Committee had to meet the following requirements during the year.		
(1) Annuities on stocks, so far as not redeemed and not converted	£22,382	
(2) Contribution to Corporation loans fund, in respect of Glasgow Corporation 3 per cent. stock redeemable in 1921, issued in lieu of converted gas annuities	8,422	
(3) Interest on borrowed money and redeemed loans	65,981	
(4) Sinking fund	48,075	
		144,860
Leaving a surplus on the year's operations of		£3,388
This surplus added to the balance at the credit of profit and loss account, carried from the previous year's account, viz.		12,789
leaves to be carried to the credit of next year's profit and loss account the sum of		£16,177

Tar and Liquor.—Your Committee regret that the market for residuals has been unfavourable to the Corporation during the past year, and the income from this source has decreased £1484. The average price received per ton of coal carbonized this year was 3s. 2·934d., as compared with 3s. 5·059d. for the previous year—a decrease of 2·125d. per ton. The respective leases of the Dawsholm and Tradeston Chemical Works, and the contracts for the purchase of the tar and ammoniacal liquor produced at these works having expired as at June 30 last, your Committee have pleasure in reporting (1) the sale of the residuary products at Dawsholm Gas-Works and the lease of the chemical works there for a period of five years from June 30 last to Messrs. James Ross and Co., at an enhanced price; and (2) that the sale of products at Tradeston Gas-Works and the lease of the chemical works there has been continued to Messrs. Robinson and Hunter for a period of one year from June 30 last, also at an increased price.

Coke.—The sum realized from the sale of coke this year amounts to £89,588, an increase of £9208 over that of the preceding year; this being due to the greater quantity sold and a higher price per ton obtained. The quantity of coke sold last year was 302,759 tons, as compared with 274,905 tons for the previous year; being an increase of 27,854 tons. The average price received was 6s. 7 23d. per ton, as compared with 6s. 5·04d. for the previous year; being an increase of 2·19d. per ton.

Coals.—Your Committee advertised for tenders for coal to be supplied during the coming year, and have concluded contracts for almost the whole quantity required, but at prices much in advance of those of last year. The quantity of coal carbonized during the year amounted to 740,492 tons, as compared with 712,097 tons for the preceding year—an increase of 29,395 tons.

Sinking Fund.—Your Committee applied £16,253 of the amount at the credit of the sinking fund to the extinction of £5999 of £9 per cent., and £220 of £6 15s. per cent. gas annuity stocks; and the annuities formerly payable upon these stocks now cease to be a charge upon the revenue of the Department. There has also been redeemed during the year, by the application of moneys at the credit of the same fund, £4084 of Glasgow Corporation 3 per cent. stock, and a further amount of £21,925 of loans raised under the Glasgow Corporation (Tramways and General) Order Confirmation Act, 1901, and the Glasgow Corporation Order Confirmation Act, 1905. The amount added to the sinking fund during the year was £63,355. The sinking fund, with its accumulations, now stands at £668,252, of which there has been already applied in the redemption of borrowed money, £3 per cent. stock, and annuities, £594,060; leaving still available for either of these purposes the sum of £74,191.

Price of Gas.—In view of the great advance which has taken place in the price of coal, which forms the principal item of expenditure, resulting in an increased cost to the Corporation of upwards of £100,000, your Committee regret that they have to recommend to the Corporation that the price to be charged for gas for the current year as from the date of the last survey, be as follows—viz.: (1) Lighting and domestic purposes: Within the city and suburbs generally, 2s. 4d. per 1000 cubic feet; within the Milngavie area of supply referred to in the Glasgow Corporation (Gas, &c.) Order Confirmation Act, 1902, 3s. 4d. per 1000 cubic feet. (2) Motive power purposes: Within the city and suburbs generally, 2s. per 1000 cubic feet; within the Milngavie area of supply, 3s. per 1000 cubic feet. (3) Manufacturing purposes: For manufacturing purposes, other than for lighting and domestic purposes, within the city and suburbs generally, 2s. per 1000 cubic feet; within the Milngavie area of supply, 3s. per 1000 cubic feet. Where the supply of gas is given for manufacturing purposes, such supply shall be measured through a separate meter; and the minimum amount payable therefor annually and in advance shall not be less than £3. (4) Supply through prepayment meters: 2s. 11d. per 1000 cubic feet.

Sale of Gas.—The following is an analysis of the sale of gas for the past year, as compared with the previous twelve months:—

	Rate per 1000 C. Ft.	Year 1905-6. Consumption.	Rate per 1000 C. Ft.	Year 1906-7. Consumption.
	s. d.	Cubic Feet.	s. d.	Cubic Feet.
I.—Within the city and suburbs generally:—				
(1) Lighting	2 1	4,953,185,900	2 1	4,975,227,700
(2) Gas-engines	2 0	2,997,300	2 0	—
(3) Do.	1 9	351,454,700	1 9	359,248,400
(4) Manufacturing purposes	1 9	85,658,100	1 9	164,670,300
(5) Contract gas	2 1	527,302,550	2 1	544,322,240
II.—Within the Milngavie area:—				
(6) Lighting	3 1	15,809,700	3 1	16,378,900
(7) Gas-engines	2 9	496,400	2 9	458,500
(8) Manufacturing purposes	2 9	743,100	2 9	1,339,000
(9) Contract gas	3 1	1,380,850	3 1	1,531,620
III.—Prepayment supply	2 6	40,908,433	2 6	167,946,666
		5,979,937,033		6,231,123,326
Used at works		73,008,500		77,450,300
		6,052,945,533		6,308,573,626
				Increase, 255,628,093 = 4·22 per cent.

In the above analysis of gas consumption, a gratifying feature is the increasing demand for prepayment gas supply; the increase being 127,038,233 cubic feet.

The number of gas-engines in use and the total horse-power, for this year and the preceding year, were as follows:—

	Number.	Brake Horse Power.
May 31, 1906	1,778	16,209¾
May 31, 1907	1,727	17,157¾
	Decrease, 51 = 2·87 p. ct.	Increase, 948¼ = 5·85 p. ct.

II.—WORKS.

The works and mains have been maintained in an efficient condition out of revenue during the year. The greatest quantity of gas sent out during the year in twenty-four hours was 36,179,000 cubic feet. The maximum daily make was 32,022,000 cubic feet. The quantity of gas made per ton of coal carbonized was 9391 cubic feet, as compared with 9416 cubic feet for the previous year. The loss by unaccounted-for gas during the year was 9·28 per cent., as compared with 9·72 per cent. the preceding year. Upwards of 23 miles of new mains have been laid during the year.

The number of meters in use on May 31, 1907, was 256,239; being an increase of 13,955 over the number in use at the same date last year. There are now in use 229,062 ordinary and 27,177 automatic or prepayment meters. During the year, 25,926 meters were repaired, and 9300 were examined while in use, of which 7484 were found in a satisfactory condition, and 1816 were found defective and removed. The number of gas-stoves on hire as at May 31, 1907, was 39,216. There are also 3216 stoves and small grills let out free of charge. The number of gas heating and cooking appliances sold during the year was 3101. In view of the large increase in the demand for gas, the questing of providing considerable extensions of producing plant will require to be considered in the near future. Part of the old works at Dalmarnock is being repaired and put into working order, so that it can be used if necessary to assist the other works at the time of the heaviest demand during the ensuing winter.

The stock capital is stated at £300,000 bearing annuities at the rate of 9 per cent., and £115,000 bearing annuities at the rate of 6¾ per cent. The total amount of annuities was originally £34,762 10s., but is now reduced to £21,900 16s. by the operation of the conversion scheme and sinking fund; the stock capitals being left at £188,690 and £72,870 respectively. The loan capital amounts to £4,200,000, of which £1,400,000 is for electricity purposes. For the Gas Department, there has been borrowed, out of the Corporation Loans Fund, £1,527,015; and of this there has been redeemed £322,985. There remains to be borrowed for gas purposes £850,000.

The amount of capital expenditure during the year was £62,429. Of this sum, £4133 was expended at Dawsholm station and works, £64 at Tradeston, £2677 at Provan, £106 at Provan chemical works, £15,316 upon pipes and cost of laying, £28,577 upon meters, and £13,135 upon gas-stoves. The depreciation written off during the year amounted to £54,668. Dalmarnock station and works have been depreciated from £257,708 to £57,597—the amount written off during the year having been £749. Dawsholm station and works have been depreciated from £566,745 to £282,850, Tradeston station and works from £340,885 to £175,068, Temple station and works from £233,573 to £165,618, and Provan station and works from £780,037 to £745,449. Pipes and cost of laying have been depreciated from £824,842 to £480,958, gas-meters from £527,523 to £222,335, and gas-stoves from £148,642 to £60,968.

In the revenue account there is shown, as derived from the sale of gas, £641,063—an increase of £27,431; from coke, £89,588—an increase of £9208; from ammoniacal liquor and tar, £122,687—a decrease of £1484; and from stove-hires, £6953—a decrease of £1859. The total revenue was £865,470—an increase of £33,300. On the expenditure side, the cost of coal was £360,432—an increase of £19,066; purifying materials, and oil, water, and sundries at works cost £33,134—an increase of £601; salaries of engineers, superintendents, and officers at works amounted to £5021—an increase of £235; repairs and maintenance of works and plant, machines, apparatus, tools, material-, and

labour, cost £58,659—an increase of £77; and wages cost £79,854—an increase of £4464. The total cost of manufacture was £539,925—an increase of £24,596. Distribution cost £62,809—a decrease of £1914; in the stove account the expenses chargeable to repairs amounted to £10,804—an increase of £2639; rents and feu-duties amounted to £8561—an increase of £194; rates, assessments, and taxes were £23,926—an increase of £1149; management cost £14,074—an increase of £1496; law and parliamentary charges amounted to £654—a decrease of £223; and retiring allowances, to £1799—an increase of £254. The total ordinary expenditure was £662,554—an increase of £28,193. The depreciation of £54,668 was distributed as follows: On gas-works, at 1½ per cent., £18,283; on chemical works, at 2½ per cent., £2405; on pipes, at 2½ per cent., £11,939; on stoves, at 10 per cent., £12,367; and on premium, at 2½ per cent., £4358. Adding the sum allowed for depreciation to the ordinary expenditure, the amount on the expenditure side is raised to £717,222, which is greater than the corresponding figure of last year by £24,617. The balance carried to profit and loss account is £148,248, which is £8682 more than a year ago.

Gas was manufactured as follows: At Provan, 2,163,041,000 cubic feet, as compared with 1,941,913,000 feet in the previous year; at Dawsholm, 2,773,102,000 cubic feet, as compared with 2,781,752,000 feet; and at Tradeston, 2,017,825,000 cubic feet, as compared with 1,980,879,000 feet.

Debate in the Council.

Ex-Bailie CALDERWOOD, the Convener of the Gas Committee, in submitting the accounts, said they showed the finances of the Gas Department to be in a very favourable condition. They had still to report, so far as tar and ammoniacal liquor were concerned, that the market had been very low, and that there had been a decrease in the return of £1484. During the year the leases expired both at Dawsholm and Tradeston, in connection with that department. They advertised; and the result was that they had accepted offers at increased rates. A considerable addition was looked for from those products. They had been very successful in the coke department; having realized £89,588—an increase of £9208, which was very satisfactory. There had been a few complaints about the quality of the coke; but he thought the figures showed that the public, in spite of all its faults, still felt a desire to have it. He was very glad to be able to say that in the year to come they expected to have a considerable increase of income from this source, as they anticipated better prices. There was one thing the Committee had to regret—that they had this year to meet a very large advance in the price of coal, and that the Committee had thus no alternative but to recommend the Corporation to add 3d. per 1000 cubic feet to the price of the gas. They were sorry they had to do this; but they could not help themselves. The increase in the price of coal meant to them something like £108,000 in the course of the year. He would like to call their attention to the abnormal increase of business in connection with prepayment meters. In the year before last, they sold about 41 million cubic feet through those meters; last year they sold 167,946,666 feet—an increase of about 127 million cubic feet. There had been a very great increase in the number of prepayment meters. Two or three years ago, they had only a few thousands of them; while at present they had 27,177 such meters altogether. They did not wish to push the prepayment meter; they intended to put them only into tenements where there had not been gas before. They did not want, where a meter was in use, to make any change; and he thought the consumers would themselves agree with this, because they had to pay considerably more for their gas if they used a prepayment meter. They proposed to increase the price of gas used in connection with prepayment meters by 5d. per 1000 cubic feet, making it 2s. 11d. Some might take exception to the proposal to put 5d. on to gas used through prepayment meters, and only 3d. upon that consumed through ordinary meters. But with ordinary meters the increased charge would be as from April last; while in the case of prepayment meters they would require to make an alteration in the meters, and until this was done the consumers who had those meters would be having gas at the old rate. It would be four or five months from last April before the new charge would come upon them. The cost of altering the meters would be nearly £1000. They did not propose to alter the meters again should gas come down in price, but to give the consumers so much back on the amount in the meter. The number of gas-stoves in use was increasing. They had now 3216 small grills and stoves given out free of charge; and these had been a great benefit to the poorer classes. In view of the large increase in the demand for gas, the Committee had been taking into consideration the desirability of extending the producing plant—of course, at Provan. There had been an increased output of gas last year of over 250 million cubic feet. When they considered a town like Perth, where they had an output of somewhere about 200 million cubic feet during the year, and when they considered a town like Kilmarnock, where they had an output of something like 190 million cubic feet in a year, they would see what a very large increase they had in Glasgow. In spite of all the difficulties they had to encounter in the Gas Department, their output of gas was still increasing; and he hoped this would long continue, because their revenue was chiefly from gas. They had been sometimes told that the gas accounts were not in a condition to be easily understood. A Committee had been appointed to consider this subject, and had had several meetings; but they had not yet finished their work. They had no doubt, however, that something would soon be done in the matter.

Bailie M. W. MONTGOMERY seconded.

Treasurer STEVENSON remarked that he believed the gas accounts were the best stated accounts in connection with any department of the Corporation.

Mr. T. SUTHERLAND moved that the increased price for gas consumed through prepayment meters should be 3d., instead of 5d. as proposed. He thought that every citizen should pay the same price. They had 27,000 of those meters among the respectable poor in the city—people who, if they did not have prepayment meters, would not burn gas. It was no argument to say that these meters cost more. The Gas Committee got people to take up the meters for the sake of the sale of gas. It would cost nearly £1000 to alter the mechanism of the meters; and supposing they made the charge 2s. 8d., it would be about the same, because 2d. per 1000 cubic feet would be about £1400. All the sum which was involved would be about £4000. Give those people the benefit of improved light, and make their lives more comfortable. To raise the price by 5d. would not be doing justice.

Mr. W. MACLURE seconded. Why should they, he asked, charge people who paid in advance, more than people who took credit, and who sometimes did not pay at all? It was argued that it cost more to supply gas in that way. This was admitted; but the whole object was to encourage the consumption of gas, and prepayment meters did that. Instead of altering the meters, give those people gas at the same price; and possibly at the end of the year the cost of coal would have come down, and they would not then require to raise it.

Mr. W. F. ANDERSON did not see the necessity for altering the meters, because, if the price of coal came back, they might not require to alter them. He suggested that this recommendation should be taken back, in order to see if there were not a more business-like solution than was proposed.

Mr. A. MURRAY pointed out that, if the money were in the meter, it was an easy matter to give back part of it; but they would have a difficulty if they were to ask the people to pay 10 or 15 per cent. more than was in the meter. The question had been raised whether it was fair to charge these people 5d. extra, when ordinary consumers were only to be charged 3d. extra. As a matter of fact, what the prepayment consumers were to be charged was 3½d. extra, because they were only to be charged for eight, or probably seven, months in the year at the increased rate. For some time yet, they would only be paying 2s. 6d. He thought ½d. was a reasonable charge for the cost of altering meters. He considered that the proposal of the Committee was a fair and reasonable one, and ought to be carried through. The Engineer had calculated the matter, and the work could not be done without the increase proposed. It would be fair in the long run. The only consumers who would take the slightest disadvantage would be those who only came to use a meter after the extra charge was put on; but these would be very few, and next year by giving them discount they would be put in the same position as others.

Bailie GUEST was very sympathetic with the suggestion made; but the matter was threshed out in the Committee, and their experience was found to have been that the difference was not sufficient to cover the increased cost, because, first of all, a prepayment meter cost about 20 per cent. more than another meter, and then there was about 10 per cent. of extra cost in collecting the money. He asked Mr. Wilson why he had selected that particular figure; and he replied that it would work out better than any other. The meters would be altered so as to charge what would be likely to be the highest price which gas would ever probably reach in Glasgow; and they would not, consequently, have to alter them again.

Mr. SUTHERLAND, after the explanations which had been made, withdrew his amendment.

Mr. J. GRAY was sure they were all very distressed about the increase in the price of coal. He was told that for every increase of a shilling in the price of coal, the workman got 3d. per ton. He did not know where the difference went. He observed from the accounts that they were paying considerably more for collectors and account deliveries. He thought it was very hard for the Police Department, who paid annually about £60,000, that they should pay the same price as others, seeing there was no cost for collection or other extra charges. Why should they not get a discount? He would like also to know whether it would not be a good thing to charge the same rate in the outside burghs. There was another matter he would like also to bring before the Convener. As the gas undertaking was enabled to borrow money at a low rate from the Corporation, why should the ratepayers not get some benefit directly from it in aid of the rates? In Manchester last year, £60,000 was paid out of the gas profits to the rates; and in Birmingham, Belfast, and other places they obtained large assistance in the same way. He wished the Committee would apply themselves to these various questions, and bring up an answer, though not probably that day.

Bailie W. F. RUSSELL said that the greater proportion of the increase in the cost of coal went to the miners; but unfortunately the more the miners got, the less they worked. As to the cost of collectors, at the present moment a Sub-Committee had this under consideration; and he thought, seeing this was the case, these men should not have been increased about 18 per cent. It had been pointed out before that the collectors had to enter large establishments; and the people were really not encouraged to send their rates to the office, but to wait till they were called upon. It was explained that the increased cost of collection was the prepayment meters, because new men had to be taken to do this work. He thought they should try to encourage the public to send in their money, and that they should employ their own men to collect from prepayment meters. He was told that the man who was collecting gas-rates every day was not capable of collecting from prepayment meters. Why this should be so, he could not understand.

Bailie P. G. STEWART considered that they started prepayment meters far too soon. Their Law Agent had told them that they could not charge differential rates for gas. The real way to have kept down the price of coal was to have accepted the opinion of Mr. Foulis eight years ago. If they had done this, they would have been in a very different position to-day. He recommended the purchase of a coal pit. Coalmasters were reaping fortunes at the expense of the citizens of Glasgow. They should buy coal mines, have their own miners, and treat them generously, and not have the juggling with coal which they saw all over the country to-day.

Mr. CALDERWOOD pointed out that they had very large consumers in connection with railways and public works; and if the Corporation were to give discount to the Police Department, they would have to give discount to those large consumers too. As to the other remark of Mr. Gray, while the gas had been doing pretty well, if the Corporation wanted to add anything to the rates from the Gas Department, the Committee would require to consider the necessity of raising the price of gas. The increased cost of collection was accounted for by the prepayment meters. It was a very fair question for the Committee to consider whether they should issue notices to the consumers asking

them to forward their rates. This was a matter which was probably worth going into. They knew perfectly well that there was a very large section of the community who did not use gas; and this would require to be taken into account.

The accounts were then approved.

SOUTH METROPOLITAN GAS COMPANY'S ACCOUNTS.

[For the Half-Yearly Report, see p. 381.]

The following are the principal portions of the accounts of this Company for the six months ending June 30.

The first two statements relate, as usual, to the stock and loan capital. The former sets forth that the standard rate of 4 per cent. is payable on £6,011,224 and £418,671 (Act of 1901) of stock; while the latter shows that the loan capital, the rate of interest on which is 3 per cent., amounts to £1,798,994 and £96,451 (Act of 1901). The third statement is the capital account. It stands as follows: Amount received, £5 328,820; nominal amount added by conversion (less premium), £2,996,520—total, £8,325,340. The items of expenditure are as follows:—

Capital account to Dec. 31, 1906		£4,989,802 10 5
Expenditure during half year to June 30, 1907, viz.—		
New buildings and machinery in extension of works	£2,670 0 9	
New and additional mains and services	11,363 7 6	
New and additional meters	6,085 9 10	
New and additional stoves	2,575 0 8	
		22,694 18 9
Total expenditure		£5,012,497 9 2
Balance		316,322 10 10
		£5,328,820 0 0
Nominal amount added by conversion, less premium		2,996,520 0 0
Total		£8,325,340 0 0

The following is the revenue account:—

Expenditure.

Manufacture of gas—		
Coal into store, including labour	£381,220 8 10	
Purification, including labour	15,243 2 8	
Salaries of Engineer and Officers at works	15,363 18 10	
Wages (carbonizing)	58,703 7 11	
Repairs and maintenance of works and plant, including labour, less £5856 11s. received for old materials	89,416 3 7	
		£559,951 1 10
Co-partnership for twelve months to June 30, 1907	£45,590 9 0	
Less on account	18,000 0 0	
		27,590 9 0
Distribution of gas—		
Repair, maintenance, and renewal of mains and service-pipes, including labour	£25,872 3 8	
Salaries and wages of officers, including rental clerks	17,874 13 3	
Repairing and renewals of meters, including labour	16,831 9 3	
Repairing and renewals of stoves, including labour	20,213 2 0	
Repairing and renewals of gas fittings, including labour	8,375 13 2	
		89,167 1 4
Public lamps, including £20,104 2s. 3d. for labour and materials, less £16,410 11s. 9d. received for the same		3,693 10 6
Rents, rates, and taxes—		
Rents payable	£883 19 9	
Rates and taxes	41,606 1 1	
		42,490 0 10
Management—		
Directors' allowance	£2,531 18 0	
Salaries of Secretary, Accountant, and clerks	3,839 11 10	
Collectors { Ordinary	6,779 19 3	
Collectors { Slot meter	7,919 1 4	
Stationery and printing	2,781 15 10	
General charges	8,913 14 3	
Company's Auditors	112 10 0	
		32,878 10 6
Law charges	£422 16 5	
Parliamentary charges	—	
		422 16 5
Bad debts		1,376 8 1
Pensions and officers and workmen's superannuation, sick, and accident funds		6,870 13 0
Gas Referees and Official Auditor		251 14 1
Leasehold renewal fund		300 0 0
Total expenditure		£764,995 5 7
Balance carried to net revenue account		219,591 3 0
		£984,586 8 7

Receipts.

Sale of gas—		
Lady-Day, at 2s. per 1000 feet	£364,302 18 6	
Midsummer, at 2s. per 1000 feet	255,848 12 10	
	£620,151 11 4	
Public lighting	15,099 1 3	
		£635,250 12 7
Meters in use (322,336)—		
Company's meters at rent: Ordinary, 100,767; slot, 212,915	£35,387 5 5	
Company's stoves at rent: Ordinary, 74,220; slot, 176,755; fires, 21,387	28,452 15 0	
		63,840 0 5
Residual products—		
Coke, less £16,198 15s. 1d. for cartage and labour	£177,390 1 6	
Breeze, less £5095 11s. 8d. for cartage and labour	6,717 13 10	
Tar and tar products	37,086 13 5	
Sulphate of ammonia	62,474 3 9	
		283,668 12 6
Rents receivable		1,728 3 1
Transfer fees		99 0 0
Total receipts		£584,585 8 7

The net revenue account shows a sum of £177,126 12s. 5d. applicable to dividend on the ordinary stock. Following this are the statements relating to the reserve, renewal, and insurance funds. They show that the balances on June 30 were as follows: Reserve fund, £181,028 renewal fund, £26,199; insurance fund, £108,313.

The statements furnishing manufacturing details are as follows:—

Statement of Coal.

In Store December 31, 1906.	Received During Half Year.	Carbonized During Half Year.	Used During Half Year.	In Store June 30, 1907.
Tons. 104,293	Tons. 584,741	Tons. 606,667	Tons. 843	Tons. 81,524

Statement of Residual Products.

Description.	In Store Dec. 31, 1906.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store June 30, 1907.
Coke—cwts.	266,156	7,505,912	1,970,397	5,591,402	210,269
Breeze—yards	22,162	130,303	32,931	103,535	15,999
Tar—gallons	1,012,742	5,792,590	5,822,495	44,498	938,339
Ammoniacal liquor—butts	11,764	213,075	215,921	..	8,918

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lamps.
	Public Lights (estimated).	Private Lights (per Meter).		
Thousands. 6,574,985	Thousands. 157,691	Thousands. 6,249,014	Thousands. 6,493,429	23 278 incandes't 15 flat flame

The remaining statement is the balance-sheet, which gives the value of the stores in hand at the close of the half year as follows: Coal, £51,157; coke and breeze, £9097; tar, sulphate, and ammoniacal liquor, £41,635; and sundries, £286,433. The figures this time last year were: Coal, £38,452; coke and breeze, £6100; tar, sulphate, and ammoniacal liquor, £45,606; and sundries, £264,660. A sum of £61,021, workmen's bonuses and savings, has been deposited with the Company; and the total of the officers' superannuation and guarantee funds is £40,426. The figures last year were £66,071 and £34,692. The item, "Monazite sand suspense account," now stands at £9420, compared with £19,420 at the end of December, 1906.

SALFORD CORPORATION GAS SUPPLY.

The Past Year's Working.

In the "JOURNAL" for the 2nd ult., it was mentioned that the annual report of the Gas Committee of the Salford Corporation showed that there had been a considerable increase in the number of consumers in the twelve months ending the 31st of March last, and that the sales of gas had gone up 3·66 per cent. Another satisfactory feature of the year's working was the demand for gas appliances; the business in cooking-stoves having increased to a great extent, due, no doubt, to the large reductions made in the hiring rates about a year ago. The accounts accompanying the report show that the sale of gas and the rental of stoves produced a revenue of £175 848; residuals yielded £49,490; and the total receipts were £225,890. The expenditure on the manufacture of gas was £117,299; on distribution, £13,591; on management, £6565; rates and taxes came to £13,881; and the total expenditure was £155,499—leaving £70,391 to go to the profit and loss account. The amount standing to the credit of the account was £72,336. After paying £22,766 for interest and annuities, £15,309 in redemption of loans, and transferring £5000 and £5500 respectively to the works and plant and meters and stoves depreciation accounts, the net profits for the year, transferred to the district fund account, were £23,760. Under the supervision of Mr. W. W. Woodward, the Gas Engineer and Manager, the works and plant were maintained in a thoroughly efficient condition. The coal and cannel carbonized amounted to 162,784 tons; and the quantity of gas made to 1,663,415,000 cubic feet, of an average illuminating power equal to 19·25 standard candles—the parliamentary standard being 18 candles within the borough, and 17 candles as tested in the out-districts. The total receipts realized from residuals were not equal to the year 1905-6. Sulphate of ammonia and coke showed a diminution; but there was an increase in the receipts from the sales of tar.

The Purification of Spent Liquor from Sulphate Plant.—At the last meeting of the Brighouse Town Council, correspondence was submitted from Mr. John Radcliffe, of East Barnet, forwarding an amended offer to erect plant on his system to purify the spent liquor from the sulphate plant at the Mill Lane Gas-Works of the Corporation; and the offer was accepted. Mr. Radcliffe's system was described in the "JOURNAL" for the 2nd of October last (p. 22).

Inspection of Gas-Meters at Bristol.—In a minute which had been adopted by the Bristol City Council, the Sanitary and Improvement Committee stated that, having had a year's experience of the result of entrusting the duties of gas-meter examiner to the Deputy City Engineer, they were of opinion that the arrangement had worked well, and should be placed upon a permanent footing. The Committee therefore recommended that Mr. Steele be permanently appointed, during the pleasure of the Council, Inspector of Gas-Meters; and that he be paid, as from June last, a salary of £50 per annum for the performance of the duties of the office.

CROYDON GAS COMPANY.

Half-Yearly Report and Accounts.

In the report which the Directors will present at the half-yearly general meeting of the Croydon Gas Company next Friday, they state that the sales of gas in the six months ending the 30th of June exceeded those in the corresponding period of last year by 8 27 per cent.; while the number of consumers increased by 929, and that of stoves on hire by 1055. There were 58 hired stoves purchased by consumers. The Caterham works were closed for the manufacture of gas on the 6th of April. They are now being used as a depôt for the local sales of coke produced at Waddon; and negotiations are in progress for let ing a portion of the lands and buildings. The new section of scrubbing, washing, and purifying plant has been completed, and will be brought into use in the early autumn. A commencement has been made with the alteration and partial rebuilding of No. 2 retort-house, to increase its capacity and adapt it to modern methods of carbonization. In accordance with the provisions of the Croydon Gas Act, 1904, the price of gas in the Carshalton area of supply has been reduced, as from the 1st ult., to that charged in the Croydon area. In consequence of this, the holders of "C" stock will be entitled from that date to a dividend at the same rate as that upon the "B" stock.

The accounts accompanying the report show that the total revenue was £111,081, of which £80,011 was derived from the sale of gas, £7602 from the rental of meters and stoves, and £23,376 from the disposal of residuals. A sum of £54,708 was expended on manufacture and £15,650 on distribution; rents, rates, and taxes came to £4327; management cost £3879; and the total expenses were £82,911. For the corresponding period last year, the receipts were £101,471, and the expenses £76,710. The balance carried to the profit and loss account is £28,170, compared with £24,761; and the amount available for distribution is £28,511, against £24,381. The Directors recommend the payment of dividends at the rates of 14½, 11½, 10¾, 10, and 5 per cent. per annum, all less income-tax, on the various classes of stock. This will absorb £21,024, and leave a balance of £7487.

The statements relating to the working show that, under the supervision of Mr. J. W. Helps, the Engineer and General Manager, 39,278 tons of coal, 8 tons of cannel, and 495,484 gallons of oil were used during the half year in the manufacture of 613,575,000 cubic feet of gas, of which 580,862,800 cubic feet were sold and 588,846,300 cubic feet accounted for. The estimated quantities of residuals produced were: Coke, 23,692 tons; breeze, 5535 tons; tar, 482,052 gallons; ammoniacal liquor, 969,275 gallons—the make of sulphate being 329 tons.

YORK UNITED GASLIGHT COMPANY.

The report (dealing with the six months to June 30) submitted to the proprietors at the half-yearly meeting of the York United Gaslight Company last Thursday stated that the profit and loss account showed a balance of £9879; and out of this a dividend was recommended, less income-tax, at the rate of 4 per cent. per annum on the preference and consolidated ordinary stock, and the transfer of £1000 to the reserve fund. This would leave a surplus of £276 to be carried forward. During the half year 654 yards of additional mains were laid, 194 meters were fixed for new consumers, 411 cookers, 178 gas fires and boilers, and 1528 lights were fixed by the Company's own workmen in addition to those supplied by other gas-fitters, and there was a satisfactory increase in the quantity of gas sold by meter as compared with the corresponding half of last year.

In moving the adoption of the report and accounts, the Chairman (Mr. J. R. Hill, J.P.) said that, with one exception, there was nothing to which he need specially allude. The results of the half-year's working enabled them to pay the usual dividends, place £1000 to reserve, and carry forward a small balance; while the plant and premises had been maintained in satisfactory working order. They had renewed one section of retorts, and another section would need attention in the near future. Certain required alterations and improvements had been commenced at the head office; and the work was making satisfactory progress. The exceptional topic was the state of the coal market. A considerable rise had recently taken place in the price of coal; and there was great uncertainty as to the future. In addition to this, the railway companies had recently taken combined action, and given notice that they would not carry 21 cwt. to the ton, and charge the rate for a ton only, as they had been doing, but would charge carriage for the full weight. This charge was being strenuously resisted by the colliery proprietors, chambers of commerce, and other people interested; but if the railway companies succeeded in maintaining their position, it would mean an increase to the Company of some hundreds of pounds a year in the cost of their coal. Many gas undertakings had already found it necessary, owing to these causes, to raise the price of gas; and it might be that the York Company would have to take the matter into consideration.

The report was adopted, and the dividend recommended was declared.

WEST HAM GAS COMPANY.

Half-Yearly Report and Accounts.

The accounts for the six months ending the 30th of June last, to be presented at the half-yearly meeting of the West Ham Gas Company to-morrow, show that the total revenue was £146,331, compared with £131,991 for the corresponding period of last year; and that the expenditure was £114,975, against £101,134. The receipts from the sale of gas and the rental of meters and stoves, rose from £114,253 to £126,016; those from the sale of residuals, however, dropped from £20,291 to £17,726. The balance carried to the net revenue account is £31,356, against £30,857; and the amount available for distribution is £46,431, compared with £40,275. The former of the last two amounts, however, includes a sum of £19,076 brought forward; so that the net profit for the half year is £27,355, out of which the Directors recommend the payment of a dividend at the rate of 5 per cent. per annum on the preference stock, amounting to £4625; and of £5 2s. 6d. per cent. per annum on the consolidated ordinary stock, amounting to £21,675—making together, £26,300, and leaving £20,131 to be carried forward. The Directors point out in their report that, having regard to the price of gas during the period being dealt with, the sliding-scale would warrant the division of a further £528 13s. 4d. among the holders of ordinary stock; but in view of the importance of increasing the reserve fund, they recommend that this sum should be added to it. Up to the present, the greatly enhanced cost of coal has not seriously affected the Company; and consequently the Directors have not felt obliged to make any alteration in the price of gas. A large addition was made to the amount of rates and taxes for the past half year; the increase being from £6129 in the first half of 1906 to £9294. This is due to the fact that objections raised by the Directors to an excessive increase in the assessments in the West Ham Union so far back as 1904 have only recently been settled; and that the rates on the respective valuations from then to the present time could only now be fully brought into account. Applications for prepayment installations are still received in large numbers, and 4500 were supplied during the past six months.

The portions of the accounts relating to the manufacturing operations (which are in charge of Mr. John Clark, the Engineer and General Manager) in the past six months furnish the following particulars: Coal carbonized, 45,387 tons; oil used, 815,480 gallons; gas made, 859,945,000 cubic feet; gas sold, 833,988,000 cubic feet; gas accounted for, 841,988,000 cubic feet; coke produced, 27,183 tons; breeze, 5781 tons; tar, 656,831 gallons; sulphate, 493 tons.

A GOOD REPORT AT CAMBRIDGE.

The Directors' report which was adopted at the half-yearly meeting of the Cambridge University and Town Gaslight Company last Tuesday stated that the trading for the past six months had been satisfactory; and the payment of maximum dividends was recommended. The capital had been increased by the sale of £3000 of "C" stock at a very good price. The new purifier-house will, it is anticipated, be completed during the present half year. The Directors regretted to have to record the loss by death of the late Accountant, Mr. S. G. Wheaton, who had been connected with the Company for upwards of 36 years, and whose services were greatly esteemed. The vacancy has been filled by the appointment of Mr. G. W. Lawson, who was for some years Mr. Wheaton's principal assistant.

In the absence of the Chairman (Mr. E. H. Parker), the adoption of the report was moved by Mr. W. B. Redfern, the Vice-Chairman, who said he was very pleased to be able to call the shareholders' attention to a most satisfactory report. In all points, he thought he might congratulate the Company on steady and continued progress. The price of coal had risen, roughly, 2s. 6d. per ton; and this would make their coal bill something like £4000 more than it was before. Up to December, 1906, they consumed 15,351 tons of coal, and from December to June 16,906 tons—altogether 32,257 tons; so that they would see what an enormous increase this meant in their expenditure. The sale of coke would probably go some considerable way towards meeting the enormous outlay for coal; and this would at least extend up to Christmas of the present year. The gas paid for amounted to 328,447,000 cubic feet per annum, which was highly satisfactory. To meet the increased coal bill, the price of gas would require to be advanced about 3d.; but they hoped that the sale of coke and other residual products would enable them to keep the price as it was—for the present, at any rate. At the recent sale of stock, an average of £114 17s. 9d. per £100 was realized, which showed that the public had great faith in the Company. The increase of gas last year was 10,536,000 cubic feet, which pointed to the continued prosperity of the Company, in spite of any opposition they might meet with from the Electric Supply Company. He need not point out to the shareholders that a very large amount of their prosperity was attributable to the consumption of gas by people using cookers—for heating purposes, as well as lighting. Even for lighting, he found an increase among the consumers in the borough. Everything at the works was quite up-to-date, thanks to the Engineer and Manager (Mr. J. W. Auchterlonie), who was most energetic and careful with the alterations. He thought their works were something to be proud of. They were erecting new premises and repairing old ones; and everything was very satisfactory.

LIVERPOOL AND THE BIRKENHEAD WATER BILL.

At the meeting of the Water Committee of the Liverpool Corporation last Tuesday, reference was made to the above matter, and Colonel R. S. Porter said it would be the pleasure of the Committee to offer to the Chairman (Alderman Burgess) and to the city generally congratulations on the success which the efforts of Alderman Burgess and the Water Engineer (Mr. Joseph Parry) had met in London with regard to the Birkenhead Water Bill. Alderman Burgess, in acknowledgment, said that as the Bill had been reported by the House of Commons for third reading, it would be of interest that he should say something regarding the position the Liverpool Corporation adopted towards the measure. In the Bill as originally presented to Parliament, power was sought by Birkenhead to supply water within 20 miles of the Liverpool Corporation aqueduct; and this would have enabled Birkenhead to give such a supply right up to the Vyrnwy aqueduct, and in some cases beyond it. Such a power would have been very undesirable in the interests of Liverpool, and the 20 miles proposed was reduced to five in the House of Lords. But the decision of the House of Lords did not exclude places north of the Dee; and the Wirral Peninsula was left entirely open ground, in which both Corporations could compete without restriction. In view of Liverpool's agreement with Wallasey, it was necessary strongly to object to this; and the Corporation asked the Committee of the House of Commons to exclude from competition

places where agreements existed, especially Wallasey, In the year 1900 the Corporation entered into an agreement with the Wallasey Urban Council for the supply of water to their district; and the arrangement made was a fair and equitable one on both sides. The terms on which the supply was granted—6d. per 1000 gallons—were the lowest on which Liverpool supplied any water in bulk to local authorities; and Wallasey had now for some time past been taking a supply under the agreement. In view of this fact, it was thought reasonable that the Birkenhead Corporation should be precluded from supplying water in the district; and some evidence in support of this contention was given before the Committee of the House of Commons. The Committee decided that the Liverpool Corporation ought to be protected against unfair competition as regards the Wallasey area; and they introduced a clause into the Bill prohibiting Birkenhead from supplying water in that area for thirty years to come at a less price than was charged to consumers in Birkenhead. Though the provision did not in terms prohibit Birkenhead from supplying water to Wallasey, its effect would be to prevent unfair competition; and this was the danger Liverpool had to guard against. It was undesirable, in the interests of Wallasey as well as of Liverpool, that the agreement should be interfered with or tampered with; and as a result of the decision of the Committee, Liverpool might assume that the arrangement with Wallasey would now be of a permanent character, It was also necessary to oppose the Bill because it was very important for Wallasey that the water should continue to be delivered constantly to them, without any risk of interruption from the pipe-laying operations of the Birkenhead Corporation, as the Birkenhead pipe ran for two miles side by side with the Wallasey mains, and crossed them at five or six points. When it was considered that the Birkenhead Corporation had power to lay two or three lines of pipes, the importance of protection from any danger of interruption would be very apparent. Without a protecting clause, the Wallasey supply might frequently have been cut off while operations were going on; and the protection asked for was given by the Committee. With the alterations made, the Bill, as approved by Parliament, might be regarded as not unsatisfactory to the Liverpool Corporation.

Suggested Gas-Works Purchase at Nuneaton.—At the monthly meeting of the Nuneaton and Chilvers Coton Urban District Council, one of the members, in accordance with notice, introduced the question whether they should approach the Nuneaton Gas Company with the object of acquiring the concern. He explained that he should have left the matter over for the new Council to deal with, but for the fact that the time of the Council's option of purchase expired next year; and it was necessary that they should decide what they would do in the matter. In 1900, the gross revenue of the Company was £12 354; while for the last year it was £13,687. The profits in 1900 amounted to £2407, and last year to £3563, He suggested the appointment of a competent valuer to ascertain what would be a fair price to pay for the undertaking, and to see if some agreement could be arrived at with the Company for buying them out. Most of the members of the Council, he thought, would agree that they would be doing a good thing for the town by purchasing the undertaking at a reasonable figure; but he should not be in favour of the matter being settled by arbitration, as that would be a very expensive matter. The question was referred to the General Purposes Committee.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

I am able this week to give a summary of the gas accounts of the Corporation of Glasgow, and a report of what took place in the Town Council when they were submitted. What appears in the other columns of this week's issue is of more value than anything I can write, because the statements, so far as taken from the documents, are official and authoritative, and so far as taken from the remarks of the speakers, are the statements of gentlemen who live for the whole year in perfect familiarity with the inner working of the undertaking. My feeling is that everything is so complete that there is nothing which I can write about, except to add my appreciation to that which I feel sure all will entertain as to the admirable manner in which the great undertaking is conducted. So great, indeed, has been the success of the Gas Department in recent years, that, although the Provan works are not yet three years old, it is already under consideration to extend them. Within the past three years the output of gas has increased by more than 500 million cubic feet. For the past twelve months the increase was over 250 million cubic feet. In gas matters the Corporation of Glasgow are really bearing out the City's motto—"Let Glasgow Flourish." There was a plea put forward on Thursday last for easier terms for users of prepayment meters. But it was not pressed; the mover of it being convinced, by the explanations offered, that the treatment of these consumers is fair and just. Perhaps in the experience of Glasgow there may be found a lesson for others, which is to rate the meters high, and, in the event of the price of gas coming down, to return a portion of the drawings to the consumers. It is much more agreeable to the consumers to get something back than to be asked to pay something extra, the alternative being that the gas undertaking should go on altering the meters with every change in the price of gas. One member—an adept financier, too—had the temerity to suggest that the gas profits should contribute something in aid of the rates. The proposal is not likely to receive much consideration. The commonsense of the Corporation has been all along against such a policy; and the time is past for the initiation of it, because there is now such a large proportion of the well-to-do class who do not burn gas, and to have the poorer classes, who still use gas almost exclusively, relieving the upper classes of their share of assessment, would be intolerable. The only other criticisms offered were of a trifling nature.

In the Paisley Town Council on Monday, Treasurer Macbean submitted his annual statement regarding the financial position of the burgh. They were about to obtain a new Provisional Order, under which they would have power, among other things, to impose a guarantee rate for gas and electricity purposes; and there would also be new regulations for the sinking fund in connection with the Water Trust, which would liquidate the debt in fifty-four years. The Gas Department had had, as on former occasions, a most successful year. The surplus was £6044, of which amount £4800 had been voted to various trusts in relief of the rates. They had produced 10,331 cubic feet of gas per ton of coal; while the loss due to condensation and leakage was only 6·65 per cent. He regretted, however, that they would require to make an increase of 1d. in the charge for gas; but this, as was well understood, was due entirely to the increase in the

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 376.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Apl. 11	10½	Alliance & Dublin 10 p.c.	20—21	..	5 0 0
268,324	10	,,	7½	Do. 7 p.c.	13½—14½	..	5 3 5
200,000	5	May 5	7	Bombay, Ltd., . . .	6¾—7	..	5 0 0
40,000	5	,,	7	Do. New, £4 paid	4⅞—5⅛	..	5 6 8
50,000	10	Feb. 28	14	Bourne- 10 p.c. . .	27½—28½	..	4 18 3
51,810	10	,,	7	mouth Gas B 7 p.c. .	16½—17	..	4 2 4
53,200	10	,,	6	and Water Pref. 6 p.c.	15—16	..	3 15 0
380,000	Stk.	,,	12½	Brentford Consolidated	250—255	..	4 18 1
300,000	,,	,,	9½	Do. New . .	188—193	..	4 18 5
50,000	,,	,,	5	Do. 5 p.c. Pref. .	117—122	..	4 2 0
206,250	,,	June 13	4	Do. 4 p.c. Deb. .	102—103	..	3 17 8
220,000	Stk.	Mch. 14	11½	Brighton & Hove Orig.	220—225	..	5 0 0
246,320	,,	,,	8½	Do. A. Ord. Stk. .	160—165	..	5 0 0
460,000	20	Apl. 11	10	British	41—43	..	4 13 0
104,000	Stk.	Feb. 28	6	Bromley, Ord. 5 p.c. .	119—122	..	4 18 4
165,700	,,	,,	4½	Do. do. 3½ p.c. .	90—93	..	4 16 9
500,000	10	May 15	7	Buenos Ayres (New) Ltd.	10¾—11¼	−¼	6 4 5
250,000	Stk.	June 27	4	Do. 4 p.c. Deb. .	93—95	..	4 4 3
150,000	20	July 12	8½	Cagliari, Ltd. . . .	25—27	..	5 17 10
100,000	10	June 13	10	Cape Town & Dis., Ltd.	11—13	..	7 13 10
100,000	10	Apl. 26	4½	Do. 4½ p.c Pref..	8—9	..	5 0 0
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	50—52	..	5 15 5
50,000	Stk.	June 27	4½	Do. 4½ p.c. Deb. Stk.	54—56	..	4 13 9
157,150	Stk.	Feb. 28	5	Chester 5 p.c. Ord. . .	109—111	..	4 10 1
1,443,280	Stk.	,,	5⅛	Commercial 4 p.c Stk. .	105—108	..	4 16 4
560,000	,,	,,	5	Do. 3½ p.c. do. .	102—105	..	4 15 3
475,000	,,	June 13	3	Do. 3 p.c. Deb. Stk.	81—83	..	3 12 3
700,000	Stk.	,,	6½	Continental Union, Ltd.	112—1.7	..	5 11 1
200,000	,,	,,	7	Do. 7 p c. Pref.	136—141	..	4 19 3
460,170	Stk.	—	5½	Derby Con. Stk. . .	123—125	..	4 8 0
55,000	,,	Jan.	4	Do. Deb. Stk. . . .	102—104	..	3 16 11
486,090	10	July 31	12	European, Ltd. . . .	23—24*	..	5 0 0
354,060	10	,,	12	Do. £7 10s. paid	17½—18½*	..	4 17 4
15,182,590	Stk.	Feb. 14	4⅛	Gas- 4 p.c. Ord. . .	94—96	−1	4 11 7
2,600,000	,,	,,	3⅜	light 3½ p.c. max. .	88—90	..	3 17 9
3,799,735	,,	,,	4	and 4 p.c. Con. Pref.	104—107	..	3 14 9
4,193,975	,,	June 13	3	Coke 3 p.c. Con. Deb.	£2—84	..	3 11 5
258,740	Stk.	Mch. 14	5	Hastings & St. L. 3½ p.c.	95—110	..	5 0 0
82,500	,,	,,	6½	Do. do. 5 p.c.	116—119	..	5 9 3
70,000	10	Apl. 26	11	Hongkong & China, Ltd.	15—20	..	5 10 0
4,940,000	Stk.	May 15	8	Imperial Continental .	173—176	..	4 10 11
473,600	Stk.	Feb. 14	3½	Do. 3½ p.c. Deb. Red.	93—95	..	3 13 8
184,602	Stk.	Mch. 14	6	Lea Bridge Ord. 5 p.c. .	1.0—120	..	5 0 0
306,083	,,	June 27	4	L'rpool Unit'd Deb. Stk.	108—110	..	3 12 9
561,000	Stk.	Feb. 28	10	Liverpool United A . .	221—223	..	4 9 8
718,100	,,	,,	7	Do. B . .	164—165	..	4 4 10
144,140	Stk.	Feb. 14	7⅜	Maidstone 5 p.c. . .	141—147	..	5 3 8
75,000	5	June 27	5	Malta & Medn., Ltd. .	4—4⅛	..	5 11 1
560,000	100	Apl. 2	5	Met. of 5 p.c. Deb..	100—102	..	4 18 0
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	100—102	..	4 8 3
541,920	20	May 30	3½	Monte Video, Ltd. . .	10½—11½	..	6 1 9
1,775,892	Stk.	Feb. 28	4⅜	Newc'tle & G'tesh'd Con.	108—109	..	4 4 10
406,025	Stk.	June 27	3½	Do. 3½ p.c. Deb.	93½—94½	..	3 13 8
15,000	10	Feb. 28	10	North Middlesex 10 p.c.	194—204	..	4 17 7
55,940	10	,,	7	Do. 7 p.c.	13—14	..	5 0 0
300,000	Stk.	Apl. 26	8	Oriental, Ltd. . . .	140—145	..	5 10 4
60,000	5	Mch. 27	7	Ottoman, Ltd. . . .	6—6½	..	5 7 8
398,490	5	May 15	7	Primitiva Ord. . . .	6¾—7¼	..	4 16 7
796,980	5	July 31	5	Do. 5 p.c. Pref. .	4¾—5⅛*	..	4 17 7
488,900	100	June 1	4	Do. 4 p.c. Deb. .	94—96	..	4 3 4
1,000,000	10	Apl. 26	8	River Plate Ord. . . .	12⅞—13⅛	..	6 0 9
312,630	Stk.	June 27	4	Do. 4 p.c. Deb. .	93—95	..	4 4 3
250,000	10	Mch. 27	8	San Paulo, Ltd. . . .	12⅞—13⅛	..	6 0 9
125,000	50	July 1	5	Do. 5 p.c. Deb. .	48—50	..	5 0 0
135,000	Stk.	Mch. 14	10	Sheffield A	246—248	+1	4 0 8
209,984	,,	,,	10	Do. B	246—248	+1	4 0 8
523,500	,,	,,	10	Do. C	246—248	+1	4 0 8
70,000	10	June 13	10	South African	15—16	..	6 5 0
6,350,000	Stk.	Feb. 14	5⅜	South Met., 4 p.c. Ord.	120—122	..	4 10 2
1,895,445	,,	July 12	3	Do. 3 p.c. Deb.	82—84	..	3 11 5
201,720	Stk	Mch. 14	8	South Shields Con. Stk.	159—161	..	4 19 5
605,000	Stk.	Feb. 28	5⅜	S'th Suburb'n Ord. 5 p.c	117—121	..	4 10 11
60,000	,,	,,	5	Do. 5 p.c. Pref. . .	120—123	..	4 1 4
117,058	,,	July 12	5	Do. 5 p.c. Deb. Stk.	120—125	..	4 0 0
502,310	Stk.	May 15	5	Southampton Ord. . .	105—110	..	4 10 11
120,000	Stk.	Feb. 28	6½	Tottenham A 5 p.c. .	123—126	..	5 3 2
398,940	,,	,,	5	and B 3½ p.c. .	100—103	..	4 17 1
137,500	,,	June 27	4	Edmonton 4 p.c. Deb.	99—101	..	3 19 3
182,380	10	June 13	8	Tuscan, Ltd.	10¾—0¾	..	7 8 10
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	100—102	..	4 13 0
193,742	Stk.	Feb. 28	5	Tynemouth 5 p.c. max.	107—109	..	4 11 9
30,000	Stk.	Feb. 14	8	Wands- A 5 p.c. . .	—	..	—
255,636	,,	,,	6½	worth B 3½ p.c. . .	131—136	..	4 15 7
75,000	,,	,,	5⅝	and C 3½ p.c. . .	—	..	—
79,416	,,	June 27	3	Putney 3 p.c. Deb. Stk	77—80	..	3 15 0
845,872	,,	Feb. 28	5⅜	West Ham 5 p.c. Ord.	102—105	..	4 17 7
185,000	,,	,,	5	Do. 5 p.c. Pref. .	120—123	..	4 1 4
228,300	,,	June 27	4	Do. 4 p.c. Deb. Stk.	110—113	..	3 17 8

Prices marked * are "Ex div."

price of coal. The increase was agreed to; and it was remitted to a Committee to consider the charge for gas for motive power.

The Perth Town Council on Monday held a special meeting to consider the report of the Auditor upon the gas accounts for the past year. The Auditor, in a note to his report, desired the Council to state in the accounts an approximate sum to cover gas consumed between the time of the previous survey—Feb. 11—and May 15. Lord Provost Cuthbert moved that this be done, and that the sum to be entered be £1535, to be allocated as follows: To gas-stove maintenance, £850; to the common good of the burgh, £250; as a debit balance of the gas accounts, £350; and to be carried forward, £85. The Auditor, he said, had repeatedly called attention to this matter; and the Town Council, if they agreed to his motion, would be only following the practice which had been adopted in other places. The principle was a sound one, and ought to have been started when the gas undertaking was taken over by the Corporation. Mr. Paton moved that no sum be so entered in the accounts. If, he said, the motion were carried, it would practically mean their putting fourteen months' revenue into a year's account. The Auditor had called attention to the matter once or twice; but he had always explained that the money should be used in payment of debt, instead of for revenue purposes. The motion was carried by sixteen votes to six.

The following statement appears in the "Dumfries Standard" this week: "A gentleman resident in Dumfries some ten days ago called our attention to the charges made for the hire of gas-cookers in Dumfries, compared with the sums charged in Kilmarnock and some other towns. Here, 10s. per annum is charged by the Town Council for the use of a No. 3 "Main" cooker; in Kilmarnock the rent is only 3s. 8d. For No. 2 size, the charge in Dumfries is 8s. 6d.; in Kilmarnock, 3s. 2d. For No. 1 size, 6s. 6d. is charged in Dumfries; 2s. 8d. in Kilmarnock. We understand that the sums levied in Dumfries little more than pay the cost of the cookers to the Council; the accounts for past years showing profits of only 4 per cent. The Council have to keep the hired-out cookers in repair, and to replace them when worn out; and their customers have the option of purchasing them at any time, at the same price at which they are bought by the Council—payments which have been made by way of rent being reckoned part price. The Gas Committee, having had the matter brought to their notice, are making inquiries regarding the experience of other towns, and will readily adopt any suggestions which would reduce the cost to consumers, without entailing loss on the burgh. It is possible that in other towns cookers are provided at less than cost price, in order to encourage the consumption of gas; but this is a policy which has not been adopted in Dumfries. If resorted to, it might have far-reaching effects, for why, on the same principle, should the Council not provide gas-engines free, and even the gas-fittings of a private house? There are now, we understand, about 500 cookers in use in the town. Most of them are the property of the householders."

The annual general meeting of the Crieff Gas Company, Limited, was held on Wednesday last—Dr. T. N. Meikle in the chair. Out of the profits of £1250 for the year, it was resolved to pay a dividend of 7½ per cent., and to place £363 to the reserve fund. The consumption of gas increased during the year to the extent of 6 per cent. Owing to the greater cost of coal—amounting to £600 in the year—it was resolved to raise the price of gas from 3s. 9d. to 4s. 2d. per 1000 cubic feet.

Improved Street Lighting in Fulham.

At the meeting of the London County Council last Tuesday, the Finance Committee reported that the Fulham Metropolitan Borough Council proposed to enter into an agreement with the Gaslight and Coke Company, under which the Company would provide and fix new, and alter existing, gas lamps and fittings in certain streets in the borough, and the Council were to pay for the work by twenty quarterly instalments. It was proposed to deal with 1026 lanterns and 1038 burners; and the payments made to the Company would amount to £1621. This arrangement was held by the District Auditor to require the sanction of the County Council as though it were an ordinary loan. The Borough Council had accordingly asked for sanction to the borrowing of the sum mentioned, and also of a further amount of £26 5s., the estimated cost of certain incidental paving work. The Committee were advised that the sum proposed to be paid to the Company was reasonable, and they thought that sanction to the borrowing of the amount should be given, but that the further £26 5s. applied for should not be sanctioned. They therefore recommended accordingly; and this was agreed to.

South Staffordshire Co-Operation Scheme.—By invitation of the Mayor of Dudley (Mr. F. W. Cook) a meeting of municipal representatives from neighbouring places was recently held. The attendance included the Deputy-Mayor of Birmingham, the Deputy-Mayor of Wolverhampton, the Deputy-Mayor and Deputy Town Clerk of West Bromwich, the Mayor and Deputy Town Clerk of Smethwick, the Mayor and Town Clerk of Wednesbury, and the Town Clerk of Dudley. A letter of apology from the Mayor and Town Clerk of Walsall explained their inability to attend on account of a Council meeting. Mr. Cook took the chair, and said the Black Country was a peculiar place, consisting practically of one great town, connected by tramways, canals, and railways, with practically the same industries, the same difficulties, and the same monopolies to fight. Yet they found this district divided among a great number of large and small authorities, with very little intercourse between them, and consequently at a disadvantage when dealing with any great monopoly. If united by a standing conference, they could, to their mutual advantage, take united action with regard to such questions as intercommunication, health, sewage, education, &c., and also the question of dealing with power companies and the supply of electricity, gas, and water. In matters in which large areas were affected, they could make joint representations to the Local Government Board; and the voice of a joint conference would be powerful in making representations to Parliament. It was agreed to call a conference of all the local authorities in the district bounded by, and including, Stourbridge, Walsall, Birmingham, and Wolverhampton—the meeting to be held in Birmingham in October.

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CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 2.

Sulphate of Ammonia.

The market has been very quiet at all points; and, although quotations remain without material alteration, the tendency is in favour of buyers. The closing quotations are £11 15s. per ton f.o.b. Hull, £11 16s. 3d. to £11 17s. 6d. per ton f.o.b. Liverpool, and £12 per ton f.o.b. Leith. There has been a fair amount of inquiry for delivery over the autumn months; and business has been done at the parity of £12 per ton, delivered free on board. For delivery over the spring months of next year, makers still quote £12 2s. 6d. to £12 5s. per ton, according to port; but these prices are not being paid.

Nitrate of Soda.

This article is quiet at 11s. 1½d. to 11s. 4½d. per cwt., according to quality, on spot.

LONDON, *Aug.* 3.

Tar Products.

There appears to be very little business doing, doubtless owing to the slack season and to so many of the principals being away holiday making. Pitch still remains quiet; and no business is reported for either prompt or forward delivery. Continental consumers evidently intend to await the course of events. Creosote continues firm; and manufacturers maintain their prices. Carbolic acid is still in the same position. Manufacturers will not reduce their prices; while consumers do not seem at all anxious to buy. No alteration is reported in crystals. There is no change in 90 per cent. benzol; and the market is quiet for both prompt and forward delivery. There appears to be no business in 50-90 per cent. benzol and toluol. Solvent naphtha maintains its position, both in the North and in London.

The average values during the week were: Tar, 15s. 6d. to 20s. Pitch, London, 26s. nominal; east coast, 25s. to 25s. 6d.; west coast, 23s. 9d. to 24s. 6d. Benzol, 90 per cent., 7½d. to 8½d.; 50-90 per cent., 8½d. to 9¼d. Toluol, 10½d. to 11½d. Crude naphtha, 4d. to 4½d.; solvent naphtha, 1s. to 1s. 2½d.; heavy naphtha, 1s. 1½d. to 1s. 3½d. Creosote, London, 2⅞d. to 3d.; North, 2½d. to 2⅝d. Heavy oils, 3d. to 3¼d. Carbolic acid, 60 per cent., 1s. 7½d. to 1s. 7⅝d. Naphthalene, £6 to £12.; salts, 37s. 6d. to 42s. 6d. Anthracene, "A" quality, 1½d. to 1⅝d.

Sulphate of Ammonia.

This article remains in exactly the same position as last week, and prices are £12 2s. 6d. to £12 5s. for the principal London Gas Companies' makes for forward, and £12 1s. 3d. for prompt. Ordinary London price is £11 13s. 9d. to £11 15s., Leith £12 to £12 2s. 6d., Liverpool £11 16s. 3d. to £11 17s. 6d., and Hull £11 15s.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The Lancashire colliery proprietors are determined to resist the advance in railway rates on coal, coke, &c.; and on Tuesday a more general meeting of coal owners and merchants was held at the Manchester Coal Exchange, when the subject was further considered. Letters from the London Coal Merchants' Association, Wigan, and Bradford on the subject were read. After speeches antagonistic to the action of the Railway Companies, it was resolved: "That this meeting strongly protests against the increase in charges for carriage of coal, coke, breeze, and patent fuel brought about by abolishing the system in force up to June 30, 1907; being of opinion that such alterations will lead to endless friction between collieries, traders, and railway companies, and consequent litigation through short weights." The coal trade continues satisfactory. There is no change to report in the average quotations for all classes of coal. Coalowners were never in a better position, apart from railway troubles, than now.

Northern Coal Trade.

There is a strong demand for coal generally in the North-east; and as the holiday affects the output, it is probable that it will continue for some time. In the steam coal trade, the requirements are very heavy at all the shipping ports; and the collieries, having booked a large part of their output for some weeks to come, are now able to ask higher prices for any surplus for sale. Best Northumbrian steam coals are 16s. per ton f.o.b., second-class steams are from 14s. 9d. to 15s. 6d., and steam smalls from about 10s. to 10s. 6d. In the gas-coal trade, the demand is a little heavier locally, and will probably increase more sharply now that the days are beginning to shorten appreciably. Durham gas coals are quoted from about 13s. 6d. to 14s. 9d. per ton f.o.b., and are steady at these figures, with slightly higher values for special classes of fuel. In contracts, there is not much to report this week; but there have been some sales for delivery over next year, with more inquiries. The prices are put for such sales as 13s. 6d. to 13s. 9d. for second class. The pressure, however, seems to be for delivery for winter use. In the coke trade, there is activity. Gas coke is dearer for export, though irregularly so. Good gas coke is quoted from about 17s. 6d. to 18s. 6d. per ton f.o.b. in the Tyne, with a strong demand.

Scotch Coal Trade.

The market is still active and strong. Supplies are not so plentiful as purchasers would like to see them; and consequently what coal is got is being readily disposed of. The foreign demand is still very large. Prices in the retail trade are being advanced by 1s. per ton. The prices quoted, per ton, f.o.b. Glasgow, are: Ell, 13s. to 14s. 6d.; splint, 14s. to 14s. 3d.; and steam, 12s. 6d. to 12s. 9d. The shipments for the week amounted to 224,222 tons—an increase upon the previous week of 41,347 tons; but a decrease upon the corresponding week of 10,857 tons. For the year to date, the total shipments have been 8,114,836 tons—an increase upon the corresponding period of 373,744 tons.

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Congestion at the Hull and Grimsby Docks.

In an article dealing with the congestion existing at the Hull and Grimsby Docks, the "Yorkshire Post" remarks, taking into consideration the number of vessels stowed away in the different docks, and the number of large boats waiting outside in the river, if no further business came to Hull for the next three weeks, and no further steamers were to arrive, the Railway and Dock Companies would have enough to do to clear off the work in hand. The situation is rendered all the more galling to shippers by the existence of a system of preferential berths. "It is," the writer says, "a common thing to see little London boats, and others on short trades, to which special favour has been shown, coming straight into dock, quietly getting their cargoes of coal and slipping out to sea again, while the big steamers held up in the river are looking on. The grievance is a real one, and must lead to litigation. The Hull Exporters' Association complain very strongly about the preference which is being given to certain of the London gas-coal steamers, and also to the steamers loading Denaby coal; and it is an open secret that legal action is going to be taken against the Hull and Barnsley Railway Company for giving what is alleged to be undue loading preference to these interests. It is stated that the preference given the Denaby Company in the use of the hoists is granted under a long-standing agreement with the Hull and Barnsley Railway Company, who own the Alexandra Dock; but the preference extended to the London gas-coal interest appears to have no such excuse, and it is important that, in the interests of the trade generally, this question of preference by the Dock Companies should be settled once and for all. Very wide and far-reaching are the issues involved in this matter, because, for instance, if it is held to be illegal for the Hull and Barnsley to give preference at their hoists to any particular line of steamers, it would also be illegal on the part of the North-Eastern Railway Company to give preference at their docks to the steamers, for instance, which they own jointly with Messrs. Wilson, Sons, and Co., or to the Hull and Netherlands steamers, in which that Company is largely or entirely interested. Therefore, any decision estopping the Hull and Barnsley Company from giving a preference at their dock, would upset the preferential arrangements at the North-Eastern Company's docks; and each ship would then have to take its proper turn." The same condition of affairs is reported from Goole.

Price of Gas in French Towns.

In a report recently prepared by the Municipal Council of Langres (Haute Marne), the prices charged for gas in various towns in the East of France were given. Converted into English equivalents per 1000 cubic feet, they are as follows: Dijon—Public lighting, 1s. 4·2d.; municipal buildings, 2s. 5·7d.; private consumers, 3s. 7·2d.; engines, &c., 2s. 8·4d. Vesoul—Private consumers, 6s. 9d.; heating and motive power, 5s. 2d. (these prices falling after this year to 6s. 3·6d. and 4s. 6d.). Chaumont—Public lighting, 5s. 4·8d.; municipal buildings, 5s. 10·2d.; private consumers, 5s. 10·2d.; heating and motive power, 5s. 2d. Epinal—Public lighting, 3s. 4·5d.; municipal buildings, 4s. 11·4d. until 1910, and 4s. 6d. afterwards; private lighting and heating, 5s. 7·5d.; motive power, 4s. 11·4d. until 1910, and 4s. 6d. later. Nancy—Public lighting and municipal buildings, 2s. 3d.; private consumption for all purposes, 4s. Troyes—Public lighting, 2s. 3d.; municipal buildings and private consumption for all purposes, 4s. 9·7d.

Ilkeston Gas-Works Results.

Speaking at the quarterly meeting of the Ilkeston Town Council, Alderman Beardsley, the Chairman of the Gas Committee, said the gas made during the past year amounted to 103,716,400 cubic feet, which was an increase of 4,130,700 feet; and the resulting income had advanced from £11,678 to £12,304. The return for residuals was £4057, against £3993—making a total increase of about £700. The cost of manufacture, mainly owing to the larger tonnage of coal used, had advanced from £7153 to £7316. Distribution expenses had returned to the normal, and stood at £887. Nearly £200 had been placed to the repair and replacement of cookers; and, with rates and taxes and management at the usual figure, they had a total expenditure of £10,179, against £10,040; leaving a gross balance of £6368 6s. 9d., compared with £6168 for the previous year. This balance would enable them to make the necessary larger allowances for depreciation and sinking fund charges, and, with the addition of £143 from the suspense account, provide for the ordinary contribution to the rates. The number of consumers was 4778, of whom 3614 had prepayment meters—or an advance of 340 on the preceding year. There were 1623 cookers now in use—an increase of 153. The number of orders received at the office from customers had exceeded 3700, most of which were dealt with the same day as they were received. The sum of £18,105 had been handed over to the relief of the rates since the acquisition of the gas-works by the town. The total amount borrowed on the works was £73,640, which had been reduced to an outstanding balance of £58,599.

Death from Gas Poisoning.—At an inquest held before the Manchester City Coroner on Monday of last week, it transpired that Florence Philipps, the 21-year-old daughter of a Manchester shipping merchant, residing in Wilbraham Road, had suffered for the last two years from Bright's disease, and was occasionally depressed. On the 26th ult., she was left in charge of the house while the family were away. When her mother and sister returned in the evening, Florence Philipps was found dead on the scullery floor from the inhalation of coal gas. Two of the taps of the gas-stove were turned full on. The doctors called in agreed that death was from inhaling gas, but considered it possible that deceased might have been intending to use the stove, and before applying a light fell in a fit, and so met her death. The Jury returned a verdict of "Death from misadventure."

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Gas and Electricity Works Inspection at Rochdale.—Members of the Rochdale Gas and Electricity Committee, as the result of a suggestion made in the Town Council, lately paid a visit to the gas and electric works. They were conducted over the former by the Manager, Mr. T. B. Ball; and under his able guidance a most instructive time was spent. Afterwards the party inspected the electricity works in charge of the Manager, Mr. C. C. Atchison, who explained the plant in detail. Returning to the gas-works, the visitors were entertained to tea in the Committee-room by the Chairman (Mr. Walker). Here they were joined by ex-Alderman W. J. Petrie, who for many years was Chairman of the Gas Committee.

A Councillor and his Gas Bill.—Among the defaulters summoned at the Dewsbury Borough Court last week, was Councillor Fred Wilby, who, the collector stated, owed £1 10s. 9d. for gas supplied. Defendant said that, as regarded £1 8s. 11d., he had no objection to offer; but he protested strongly against the balance of the amount. He then produced a copy of the Corporation's Improvement Act, 1884, and pointed out that they were not entitled to recover—the account being beyond the date (twelve months) within which they were entitled to recover. The collector submitted that the twelve months should be calculated from the time when he made the demand for payment. The Bench, after having a consultation with their Clerk, decided to dismiss the case.

Dublin Exhibition Water Supply Cut Off.—In consequence of a dispute, the Dublin Corporation last week cut off the supply of water which had been laid on to the exhibition as a provision in case of fire. Two lines of 6-inch pipes were put down; and on these about sixty hydrants were fixed. The charge for the whole time during which the exhibition remained open was arranged to be £2; the one condition being that the water should not be used for any purpose except in case of fire. The Executive of the exhibition, it is stated, gave the undertaking required; but the Corporation officials allege that the condition has been violated, and that by attaching hoses to the hydrants the water which was intended only for fire has been used for the general purposes of the exhibition, including the water chute.

Water Conservation in Istria.—It would seem from a recent number of the "Neue Freie Presse" that an English Syndicate is about to undertake the construction of large reservoirs to provide water for drinking and irrigation purposes in Istria. According to a paragraph in "The Times" Engineering Supplement, an engineer from Vienna (Herr Schwarz) has completed the requisite surveys, and it is proposed in the first instance to carry out two mountain reservoirs—the smaller one to contain 77 million gallons, for drinking water, and the larger, with a capacity of 275 million gallons, for irrigation purposes. These reservoirs will be situated in the province of Parenzo at Sterna, in the commune of Crisiznano, and the estimated cost is for this first part of the work £166,666, while the cost of the entire scheme will amount to about £1,460,000.

London Borough Councils and Electric Lighting.—At the meeting of the London County Council last Tuesday, Mr. Ward, on the reception of the report of the Finance Committee, drew the attention of the Council to the money being spent by the Borough Councils on electric lighting. He pointed out that there were on the paper no less than three requests for loans for this purpose—the Hackney Council asking for £14,000, the Hammersmith Council for £11,145, and the Poplar Council for £5600. The County Council did not propose to promote any further legislation on the subject, or to spend any money in obtaining a bulk supply, with the result that the money was being spent by the Borough Councils. It was obvious that the distribution of electricity through small stations was more costly than if it were supplied in bulk by a large central station. The money of the ratepayers in London was really being wasted.

Explosions in Street-Boxes.—At the meeting of the Wandsworth Borough Council last Wednesday, a letter was received from the London County Council, in reply to a communication written by the Borough Council, at the instance of the Wandsworth and Putney Gas Company, on the subject of explosions caused by accumulations of gas in telephone, electric light, &c., street-boxes. The London County Council pointed out that they had approved the construction of the Electric Supply Company's boxes in the borough subject to their being built of 9-inch brickwork in cement and 6-inch concrete flooring, with ½-inch asphalte on the floor, to the outside brickwork being rendered all over with a thick coating of asphalte, and to adequate means being taken to prevent the accumulation of gas in the boxes and conduits. It was added that the County Council Committee were of opinion that the Gas Company should be urged to adopt measures to prevent leakage of gas from their mains. No action was taken upon the communication.

Effect of the Removal of the Coal-Tax.—At the half-yearly meeting of the Great Eastern Railway Company last Tuesday, the Chairman (Lord Claud Hamilton), in the course of his speech in moving the adoption of the report, referred to the effect on the Company of the removal of the coal-tax. He said they were faced by an increased expenditure of £44,000 on coal for the past half year, which was a very serious matter. The increase in the price of coal, which pressed so hard upon railway companies and upon every commercial undertaking dependent upon coal, was mainly due to the removal by the Government of the export duty. This had resulted in an extraordinary demand for coal on the part of foreign Governments and of foreign manufacturers; and colliery proprietors found it more profitable to send their coal abroad than to sell it in this country. Thus, while we were calmly depleting one of the great capital assets of our own country, the whole manufacturing industry was suffering in order that colliery proprietors and miners might grow rich at their expense. This was not the only evil. English coal was being largely used by foreign manufacturers to compete with us in our own markets; and, owing to their cheaper cost of production, they would in a short time be underselling our own manufacturers. This was not good for trade, nor was it good for railways; and he feared the effect would shortly be to arrest that commercial development which had recently taken place in the manufacturing districts of the country.

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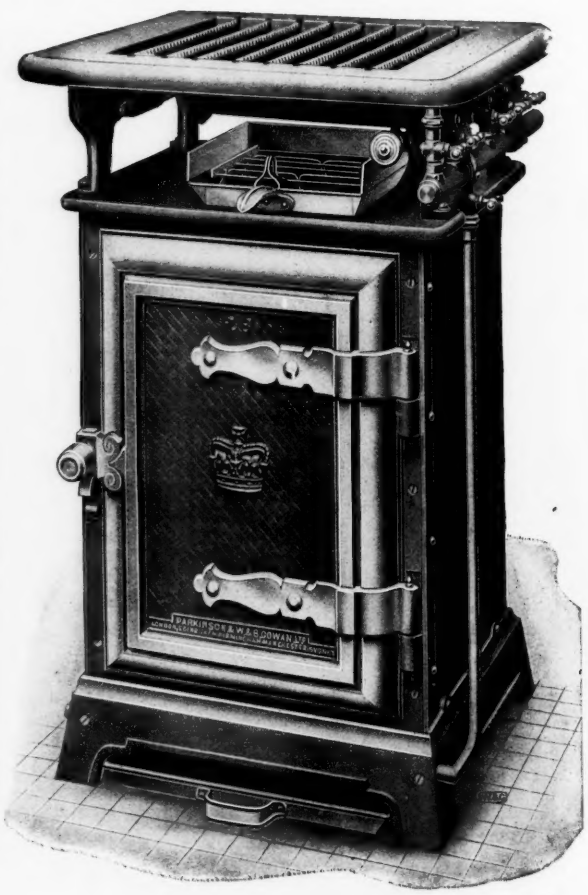

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Under the heading "Tour and Travel," Mr. Thomas Newbigging recently gave in the "Manchester City News" an interesting account of New Lanark and the Falls of Clyde.

The Halifax Gas Committee have entered into contracts for 36,000 tons of coal, which, together with the stocks in hand, will be a sufficient supply to the end of June next year. Compared with last year, there is an advance of between 2s. 3d. and 2s. 6d. a ton in the price of the new contracts. In their estimates for the year, the Committee allowed for an increase of 2s. 6d. per ton.

Last Friday night a gas explosion occurred in a tenement house in Garngad Road, Glasgow, the windows being blown out and the walls cracked. Six of the inmates were removed to the infirmary suffering mostly from shock. Some pedestrians were thrown to the ground by the explosion and stunned. James Slavin on returning to the tenement smelt gas, and searched for the escape with a lighted candle. He was badly burnt, and lies in the Infirmary. Seven families are homeless as the result of the explosion.

The Chairman of the Finance Committee of the St. Pancras Borough Council, in his annual report, gives in detail the amounts paid for gas for street lighting during the past fourteen years, and those paid for electric current and the maintenance of street-lamps since the commencement of the supply. It was, he writes, important to observe that now the borough is well illuminated by electricity the expenditure for gas lighting has been very much reduced during the last fourteen years. To give an instance, he mentions that while the expenditure on gas lighting in 1897 cost out of the rates £13,461, and the expenditure on electric lighting cost £3827, making a total of £17,288, ten years later the cost was £6946 for gas lighting and £15,690 for electric lighting; making a total of £22,636—showing the increase for the present year of £5348, or a rate of ¾d. in the pound. On the other hand, profits out of the electricity undertaking to the amount of £18,000 have been transferred in aid of the rates during the past ten years, including £8000 since the charge for current to the public lamps was reduced; but against this it has cost £35,000 more for public lighting during the past seven years than for the previous similar period.

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